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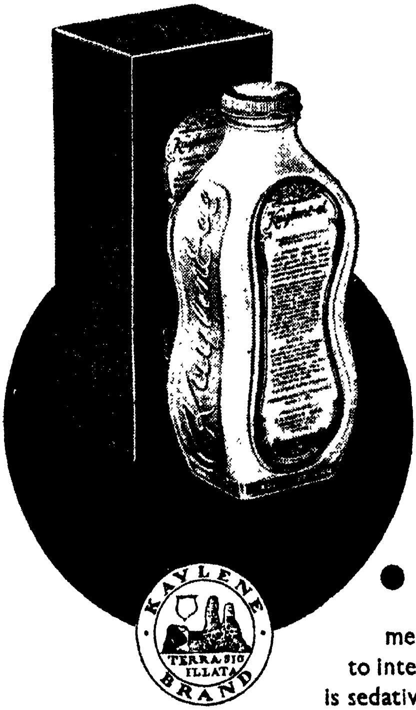

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THE PRACTITIONER

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MODERN TENDENCIES IN TREATMENT

BY J. A. GUNN, M.D., D.Sc., F.R.C.P.

Professor of Pharmacology in the University of Oxford.

THE prevention, cure and alleviation of disease are in that order of importance the aims of medical science. Complete prevention is still far distant and treatment will remain for many a year. The practice of medicine, with all the teaching and research that form the basis of it, must be judged largely by the success of its therapeutics. With the rapid and fundamental advances in physiology and bacteriology in the latter part of the nineteenth century and onwards, it was logical and historically inevitable that attention should be focused mainly upon the diagnosis and etiology of disease and that the art of treatment, the oldest branch of medicine, should have to wait in abeyance until it could be aligned with the new knowledge. This alignment is now taking place and as a result there is a revival of interest in scientific therapeutics and recent improvements in the treatment of many diseases hitherto regarded as intractable or hopeless afford ample justification for this new outlook. Until recent years treatment of disease was almost entirely empirical and, with a few conspicuous exceptions, was confined to the relief of symptoms. The importance of modern therapeutics lies in the fact that it is increasingly and scientifically curative.

Curative medicine must be based upon a knowledge of the causes of disease and must aim at a suppression, removal, or neutralization of these causes. The recognition of two main causal factors has especially contributed to a corresponding improvement in the diseases concerned.

DISEASES DUE TO INFECTION

First in importance comes the discovery of the organismal origin of diseases. That the recognition of a parasite causing a disease may point the way to a cure is well shown by the success with which the ancients could treat infection with intestinal worms. Many of the anthelmintics in use at the present day were discovered in remote times. Here was a possession by devils in which the devil could be seen by the naked eye. But even in infections with grosser parasites therapeutics has made rapid advances in this century, for example in the treatment of bilharziasis and hook-worm infections. It is, however, in regard to diseases due to micro-organisms that more revolutionary successes in therapeutics are looked for and such successes have lain chiefly in two directions: first in the use of nature's own curative methods, vaccines and antitoxic sera, and, secondly, in the use of chemo-therapeutic agents.

The use of vaccines and antitoxins is of course no longer new and possibly has not completely justified the high hopes originally entertained for this branch of treatment. Its limitations and possibilities are, however, being gradually explored. Two of the factors which have impeded progress in this direction are being gradually removed. The mistake of confounding diseases due to different micro-organisms and classifying them as a single disease is being remedied. In regard to vaccines this has led to advances, for example, in preventive treatment of different diseases grouped as "typhoid," and, in regard to antitoxic treatment, to an improvement in the treatment of diseases grouped as "pneumonia." Secondly, there is being successfully investigated a new and exact basis for the mysterious phenomena of immunity. So far as concerns treatment this is leading to the employment of purified " antibodies," with the consequent advantages of the removal of unwanted effects and the possibility of employing such larger doses as alone can produce successful remedial effects.

The use of chemo-therapeutic agents is also not novel. Quinine in malaria, ipecacuanha in dysentery, and mercury in syphilis were recognized remedies centuries ago; but progress far beyond their empiric use has taken place and new remedies have been discovered, which have completely altered the outlook of many diseases. It is in the domain of diseases due to protozoal organisms that chemo-therapy has so far registered its chief successes, and it is perhaps fortunately so because it is in those diseases that vaccinal and antitoxic treatments have especially failed. Chemo-therapeutic advances have been rendered possible chiefly by two factors. First is the recognition of the causal organism and the transmission of the disease to laboratory animals. This renders possible the rapid investigation of likely remedies on a large scale. The second factor is the advances in chemistry which have enabled known remedies to be synthesized and modified and new ones to be discovered. Without both those factors the discovery of the organic arsenicals and antimonials and of atebrin and plasmoquin would have been impossible. The treatment of such important diseases as syphilis, trypanosomiasis, malaria and kala azar has already been revolutionized by chemotherapeutic research and, in view of the comparatively short period during which such investigations have been carried on, one can hope much more from the continued co-operations of the pathologist, chemist, and pharmacologist.

One other novelty in treatment must be noticed. It has long been conjectured from mere observation that an attack of one disease may conduce to the cure of a pre-existent one, though the opposite effect is unfortunately more common. This principle has, however, not been deliberately applied until inoculation with malaria was employed for the treatment of neuro-syphilis. Whether the future will witness any considerable extension of this type of treatment cannot as yet be prophesied.

DEFICIENCY DISEASES

The second pathological discovery, which has altered medical outlook almost as much as the recognition of the rôle of pathogenic micro-organisms and is leading to equally rapid advances in treatment, is the large number of diseases due to the lack of some substance essential to the normal growth, maintenance, or functioning of the various organs of the body. Two main groups of deficiency diseases are now recognized, those due to lack of various internal secretions which the normal body itself manufactures in its glands, and those due to lack of certain essential constituents of diet, i.e. " vitamins." Beginning with the remarkable success resulting from the administration of thyroid gland substance in myxœdema, the therapeutic employment of hormones has advanced rapidly and such diseases as diabetes, pernicious anæmia and Addison's disease have been brought within the range of treatment by appropriate hormones. These advances have constituted one of the most brilliant chapters in the history of therapeutics and may well be the prelude to further successes. Biochemical research is supplying internal secretions from the parathyroid, suprarenal and other glands and clinical research is continually recognizing new types of failure of internal secretions. Rapid progress is being made in the preparation of hormones in a chemically pure condition. The structure of adrenaline and thyroxine is known and they can be prepared artificially by synthesis. All this is leading to a greater precision in the use of hormones in diseases due to lack of them and it is certain that much progress will be made in this direction in the near future. Similarly with diseases due to lack of vitamins, such as scurvy, rickets and beri-beri, two-fold progress is being made in the recognition of deficiency diseases and in providing the lacking vitamins. The existence of several vitamins is now recognized with the special diseases due to their absence from diet: their chemical nature is being gradually elucidated and their isolation achieved. It may be that lack of vitamins plays in the aggregate a less important part in the causation of disease than some have maintained, but whether this or the reverse proves true the treatment of disease as a science is bound ultimately to gain in knowledge and precision by the vast amount of research that is being conducted towards the elucidation of these problems. It must be put to the credit balance of contemporary research also that it is moving therapeutics from merely qualitative to quantitative foundations. In regard to hormones, for example, these are no doubt normally manufactured and distributed according to the demands of the body. In diseases due to defects of them artificial administration must be intermittent and regulated according to the less exquisite discrimination of the physician. But even here, owing to the provision of active principles, more accurate knowledge of their doses and varied methods of administration, it is becoming increasingly possible artificially to approximate to nature's supply of hormones in diseases where they are defective.

SYMPTOMATIC TREATMENT

While contemporary progress in therapeutics is especially characterized by its successes in the curative treatment of those two great groups of diseases due respectively to organismal infection and metabolic defects, improvement has not been lacking also in symptomatic treatment. There has been a decline of empiric treatment, perhaps to an undue degree, for it must be remembered that the use of quinine in malaria or of ipecacuanha in dysentery was originally empirical, though they are now on a scientific foundation. Pharmacological research has examined the claims of a vast number of inherited remedies and discarded most that are worthless. The knowledge of the actions and dosage of those that remain becomes more precise and new remedies are being introduced. There is scarcely a single perversion of function that cannot be treated more successfully to-day than was possible even a quarter of a century ago. Examples that readily suggest themselves are the introduction of ephedrine for asthma and the use of alkaloids of the physostigmine group for myasthenia gravis. In this connection must also be recalled the almost bewildering introduction of new local and general anæsthetics, hypnotics, and analgesics.

MODERN PHARMACY

Modern progress in therapeutics has brought in its train certain other changes, partly inevitable if not wholly desirable. The practice of giving remedies by injection is becoming more common, often necessitating that the preparations be prepared by the manufacturer in ampoules which require no further "dispensing." Many alkaloids and synthetic compounds are put up in tablet form which require no manipulation by the retail pharmacist. The use of pills or potions is declining and many important remedies pass straight from the manufacturing chemist to the patient with only the intermediary guidance of the physician and pharmacist. Moreover the medical student is no longer taught pharmacognosy and pharmacy with the thoroughness that was usual in the past and consequently the modern practitioner can rarely prescribe with the assurance and elegance that were the pride of his predecessors. The art of treatment has thus lost something of its former intimateness. Many of the large drug firms have now entered the field of chemical and therapeutic research and the medical practitioner is inundated with new remedies, often insufficiently tested. For the expenses of research necessary for the introduction of new remedies, manufacturers, naturally and justifiably, have to recoup themselves by the subsequent profits on the sale of their products. This leads to extensive advertisement and the medical practitioner is apt to be bewildered by the flood of new remedies which are rarely damned by faint praise. He has no competent authority to guide him as to whether new remedies are better than old or indeed whether the former have any effect at all. He can therefore hardly be blamed if he occasionally falls into the very human error of regarding *omne ignotum pro magnifico.* The remedies for this increasing evil are a better pharmacological education and more effective subsequent guidance. Perhaps both will come.

Better provision is needed, and no doubt will soon be provided, for the clinical testing of remedies. On the other hand many manufacturers make direct contributions to the advance of knowledge and but for their large-scale production and scientific distribution many important remedies could not reach the patient at a reasonable price.

This brief account of modern tendencies in treatment will, it is hoped, suggest that one can look forward with confidence to further substantial progress in the healing art within the near future.

RECENT ADVANCES IN DIETETICS

By S. J. COWELL, M.A., M.B., F.R.C.P.

Professor of Dietetics, University of London.

THE past year or two has witnessed an exceptional degree of interest on the part of the general public in problems connected with "food values." Only too often, however, this legitimate interest has had to be satisfied with half-truths or guesses at the truth. The relation of diet to human health and development is still only beginning to be understood. Modern principles of nutrition have been applied for so short a time to problems of human dietaries that it will not be possible for many years to judge what may and what may not be achieved by "correct" feeding throughout the whole span of men's lives. As far as the medical profession is concerned there are two main aspects of dietetics which merit separate consideration. There is first the use of diet for the treatment of established disease and, secondly, the use of diet for promoting good physical development and lessening the predisposition to various diseases.

TREATMENT BY DIET

As regards the use of diet therapeutically, many of the most valuable recent advances have been in the direction of supplying dietetic factors the absence of which from the habitual diet has led to deficiency states or diseases. Such deficiency diseases, though often caused primarily by dietetic faults, are sometimes treated more satisfactorily by massive doses of the missing food elements than by natural foods containing those elements. Treatment by the former method can scarcely be distinguished from treatment on orthodox pharmacological lines, although the prevention of such diseased conditions can usually be assured by adjustment of the diet alone. A good illustration of this principle is to be found in the recent work which has been done on nutritional anæmia, particularly by Prof. L. S. P. Davidson and his colleagues in Aberdeen. Anæmia, often severe, was found by them to be widespread among the women of that city, and the evidence which they laboriously collected pointed to a deficient iron intake in the daily food as one of the chief determining causes. Treatment of the condition by a good diet containing natural foods comparatively rich in iron was slow and uncertain, whereas treatment by massive doses of medicinal iron was usually effective in quite a short time. Again, deficiency diseases are now recognized in people whose diets have not been lacking in any known food factor, the deficiency having arisen either from an acquired inability to absorb some specific food factor or from some breakdown on the part of certain tissues of the body which interferes with the normal metabolism of a specific food factor. Thus among the victims of chronic intestinal diseases "secondary pellagra" has been recognized not infrequently and its origin is probably to be sought in mal-absorption of the pellagra-preventing substance or substances. Pernicious anæmia is an example of a secondary deficiency disease in which the fault lies not in an actual food deficiency, but rather in a defective mechanism in the stomach for elaborating from certain food elements the necessary specific substance which stimulates the formation of red cells. Such secondary deficiency diseases, though not always readily amenable to simple dietary adjustment, may be readily amenable to comparatively large doses of the appropriate factors.

This tendency to employ pharmacological substances in place of natural foods is met with in the treatment of chronic urinary infections. The high-fat: low carbohydrate diet which has been used with considerable success in such conditions has already a serious rival. The therapeutic effect of this diet probably depends on the production and excretion in sufficient concentration in the urine of β-oxybutyric acid, and it is well known that for the attainment of this end the diet must be most rigorously controlled, usually to the patient's great discomfort. It is now claimed that equally good results may be obtained by keeping the patient on his usual diet and giving him by mouth mandelic acid, which apparently has the same sort of effect as naturally produced β-oxybutyric acid.

DIET AND PREVENTIVE MEDICINE

Although many of the modern discoveries of nutritional science have been divorced from their natural application by way of dietary control in so far as the treatment of disease is concerned, preventive medicine should still rely mainly on the selection of a suitable dietary of natural foods to foster that state of good nutrition which favours good physical development and raises the resistance of tissues to disease. This the general public is beginning to realize. There would appear to be no doubt whatever that a great deal of preventible illness is caused directly and indirectly by imperfect diet in countries such as ours where definite deficiency diseases are, with one or two exceptions, uncommon. The difficulty at present is to define with any certainty the requisite qualities of a good diet for human beings. To collect direct evidence on such a point is obviously an undertaking of enormous magnitude which would require an elaborate organization. To judge from the newspaper controversy which raged last year on the subject, the nutrition of human beings would seem to depend on supplying them with an exact number of calories and a precise amount of first-class protein. This was, of course, due to general ignorance; every medical man knows how variable is the amount of food consumed by different individuals in comparable states of nutrition. Probably the most practical suggestion which can be given to the ordinary individual in the present state of knowledge will turn out to be the advice to include regularly in his diet liberal quantities of the so-called protective foods, dairy produce, fresh vegetables and fruit, and to leave the rest of the diet to the individual taste.

SPECIAL CASES

In the case of certain classes of individuals, however, it is becoming generally recognized that more precise care in the choice of diet will have to be exercised if adequate nutrition is to be fully attained. Children, especially during their first years of growth, and women during pregnancy, require larger proportions of protective foods to ensure that their tissues do not suffer under the strain of rapid development to which they are subject. Certain food elements are already known which are particularly likely to be lacking in the ordinary diets of individuals belonging to these classes, their deficiency not uncommonly resulting in recognizable symptoms of disease. Among these may be included the mineral elements calcium, iron and iodine and certain of the vitamins. So much has been written about the calcium requirements of children that it is not necessary to stress it in any detail. A generous supply of calcium and phosphorus, together with a liberal supply of vitamin D is essential for the perfect development of the bones and teeth of the child. Since milk is one of the richest sources of calcium among common foods, its provision for children on a liberal scale would seem to be justified for this reason alone, and the recent agitation for making it more readily available in poor households is all to the good. It is, however, not perhaps so generally realized that the pregnant woman, especially during the last few months of her pregnancy, requires large quantities of calcium in her diet to supply her rapidly developing fœtus with all it needs without sacrificing her own valuable stores. A severe degree of calcium deficiency, particularly if combined with a deficiency of vitamin D, leads, as is now well known, to osteomalacia. But minor degrees of deficiency of these elements are almost certainly related to some of the common disorders associated with pregnancy. The spread of dental caries and the painful muscular cramps which are common features of pregnancy would appear to be due to this cause and to be preventable to a large extent by appropriate measures to make good the deficiencies. Evidence is now being accumulated to show that some of the toxæmias of pregnancy may be prevented by similar means, that is by increasing the supply of calcium and vitamin D.

The question of the iron requirements during infancy and pregnancy has recently been receiving a good deal of attention. Dr. Helen Mackay has worked out with great care the frequency of anæmia among infants in the East End of London and has shown that it is of nutritional origin associated with diminished resistance to infections and that it can readily be prevented or cured by adding to the milk diet some simple preparation of iron. Of equal importance to this nutritional anæmia of infancy would seem to be the anæmia which is frequently associated with pregnancy. The common form of anæmia during pregnancy in this country, though almost certainly of nutritional origin and associated with a deficiency of iron in the habitual diet, is most satisfactorily treated by liberal doses of medicinal iron. The recognition of this anæmia and its correction by suitable treatment are rapidly becoming more widespread in this country, and it may be possible in the next few years to determine the extent to which some of the difficulties and dangers of labour and the puerperium are due to its presence.

A word may be said on the question of iodine deficiency. An adequate supply of iodine is still to be regarded as the key to goitre prevention, but there seems little doubt that successful prophylaxis depends largely on ensuring a sufficient supply of iodine to the developing fœtus, which means giving the pregnant mother iodine in some form or other. The simplest method of doing this in our country is that sea-fish should be eaten once or twice a week during pregnancy.

These few examples may serve as indications of the special food requirements of pregnant women and children. It would be idle to pretend that the knowledge exists at present to enable ideal diets to be devised which would ensure perfect physical development of the human child and promote perfect health of the mother during her pregnancy, labour and lactation. Nevertheless, it is becoming more and more apparent that wise feeding plays a large part not only in determining the health of women throughout the period of their reproduction and in regulating the development of the growing child, but it is also capable of affecting the health of the offspring in later life. It is known that the body adapts itself in a remarkable way to changes of environment, including drastic changes in dietaries. Yet there is no doubt that dietary deficiencies in early life can lead to imperfections in the growth of the tissues which cannot be repaired in later life by the most perfect diet. Direct evidence on such a point as this is not easy to obtain when dealing with human material, but the truth of the general principle is suggested most strongly by a mass of experimental data obtained from animals. In the nature of things advances in knowledge of the full prophylactic effects on human beings of a good diet are bound to be slow. The general awakening of interest in the subject both within and outside the medical profession should foster the collection of further facts dealing directly with human material without which permanent progress in dietetics must be uncertain.

NEUROLOGY AND GENERAL MEDICINE

BY EDWIN BRAMWELL, M.D., F.R.C.P.

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THE purpose of this article is to review the relationship of neurology to general medicine with reference to recent advances. A resolution was passed with acclamation at the first International Neurological Congress, held in Berne in 1931, that "Neurology represents an entirely independent specialty in medicine." On the other hand an eminent neurologist has recently affirmed that "the practice of medicine is the practice of neurology." What is to be believed? Strange though it may seem, these two apparently contradictory expressions of opinion are not incompatible. Neurology must admittedly be recognized as a specialty; at the same time, unlike many of the specialties, it has been progressively extending its bounds, drawing closer and closer to general medicine and indeed colouring it. Medicine and neurology are inseparable; divorce is unthinkable. The words of Sir William Gowers—"The neurologist must be a specialist, he cannot be an exclusivist"—become more obvious every day. Conversely it must be emphatically affirmed that a general neurological training is of the first importance in the education of the undergraduate—the general practitioner and specialist of the future. What then is meant by neurology? It is proposed to provide a general conception rather than to attempt a precise verbal definition. By way of introduction it is instructive to discuss the origin of clinical specialism, its advantages and dangers, and the relationship of the specialist to the general practitioner.

SPECIALISM

Specialism in medicine has existed from the earliest times; there were specialists in the days of ancient Rome. Anyone may call himself a specialist, but the quack, mountebank and pseudo-specialist must, however, be distinguished from the true specialist, i.e. he who has devoted particular attention to, and has acquired an exceptional knowledge of and experience in, the particular department he professes. Specialism has been forced upon the clinicians for various reasons and in different ways. The manipulative dexterity and experience demanded by certain operative procedures has necessitated the creation of experts. As a direct consequence of the segregation of certain diseases—the insanities, the fevers, tuberculosis and syphilis—and the establishment of special hospitals or departments for their treatment, those in charge of these institutions acquired a quite unusual experience of these disorders and became specialists. With the progressive growth of knowledge, the time came when no one could claim familiarity with the whole field of medicine. Specialism became a necessity. The specialties will continue to multiply.

But while specialism is admittedly essential, both in relation to the practice and progress of medicine, the outlook of the specialist, and particularly the clinical specialist, may become dangerously restricted. His attention may be so closely focused upon his particular field that he fails to see or fails to realize that he cannot be expected to grasp, the picture as a whole. Constantly on the outlook for some local physical cause to account for general manifestations, he may attach altogether undue significance to coincidental abnormalities. In this enthusiasm for the diagnostic and operative procedures with which he happens to be familiar, he is apt to become a materialist, and he sometimes determines or perpetuates a neurosis by indiscreet remarks, unnecessary methods of diagnosis or meddlesome surgery. The clinical specialist must always remember that he is called upon to treat the patient suffering from disease. A general physician—Ryle of Guy's Hospital—puts the matter well when he writes: "In hospital work the temptation to be interested in man's pathology rather than in man himself is one which some find difficult to resist. . . . Science forges ahead, often to the embarrassment of practice. . . . Human psychology in its daily practical bearings (and more than half of medicine is psychology) must take its place beside a more practical and less elaborate human anatomy, physiology and pathology."

The general practitioners constitute the backbone of medical practice. It is the family doctor who should be the first court of appeal. Everyone should have his family doctor, who must not be forced upon him but whom he has a right to choose, a man whom he can call his friend, in whom he has confidence and to whom he should always go before he consults a specialist. An unfortunate tendency, which has been becoming more prevalent of late, especially among the upper classes, for the patient to consult the specialist directly according to what he believes to be the nature of his trouble, is a serious menace to the effective practice of medicine and calls for the strongest condemnation in the patient's interests. A general surgeon for whose opinion I have a great respect said to me recently, "I am not the person to decide whether a patient should be operated upon, nor are you"—he was not speaking of emergency operations—"it is the patient's family doctor who knows him and his circumstances and how an operation, whether a surgical success or not, is likely to affect him." With these words I am in entire agreement, but with the proviso that the general practitioner must possess the necessary attributes. The family doctor is, perhaps I should say should be, a specialist on what may be called the personal side of medicine. And it is the duty of the clinical teacher, is it not, to emphasize this important aspect of medical practice in his teaching?

THE ORGANIC DISEASES OF THE NERVOUS SYSTEM

What do clinicians mean when they speak of neurology? By common consent the word is employed to include both the organic diseases and the "functional" disorders of the nervous system. Let us consider the steps which led up to the recognition of neurology as a specialty, and the reason why the "functional" disorders, and more particularly the neuroses, came to be included in the neurological domain.

Waller's discovery, that a nerve fibre dies when it is separated from its parent cell, and the introduction of the histological methods of Marchi and of Weigert, made it possible to trace tracts of fibres, interrupted by disease or divided in the experimental animal, from their origin to their source. The destination of tracts of fibres connecting the different regions of the central nervous system with one another and with the periphery was thus determined, a number of diseases with distinctive tract degenerations were differentiated, and the function of some of these tracts, as also the mode of production of some of the symptoms and physical signs presented by the diseases in question, were explained. The mass of anatomical and clinical knowledge was so rapidly extending that an individual who wished to acquire an exceptional experience of the diseases of the nervous system, and at the same time to advance the subject, had of necessity to specialize. Thus it was that the specialty of neurology came into being.

The progressive change in the outlook of the neurologist with the passing of the years provides an interesting chapter of medical history. In the early days, the neurologist was engrossed in the study of nerve tracts and the localization of function in the nervous system. He pictured the nervous system as composed essentially of neurones each of which constituted a distinct anatomical and genetic unit; his conception of the nervous system was predominantly anatomical. But as time went on, the work of Sherrington, Pavlov and others directed his thoughts into physiological channels. The field for anatomical exploration was being gradually exhausted, the day of morbid anatomy was passing, and the neurologist began to think in terms of function. Gradually it came about that the physiological reflex arc rather than the anatomical neurone took its place as the unit of the nervous system, as the counter of thought one might say, in the mind of the neurologist. Recently, however, an additional view-point has been gradually emerging for the neurologist's interest is turning more and more to etiological considerations. The neurological horizon has been gradually extending and involving more and more of the field of medicine.

Milestones in the history of medicine are always interesting. It was in 1894 that Schäfer and Oliver demonstrated to the Physiological Society the remarkable effect of the injection of a suprarenal extract into the blood. Sir Charles Sherrington in the first Sharpey-Schafer lecture, which he delivered in June of this year, described in graphic language the impression produced by this experiment. All who were present realized, he said, that this was a discovery of the first magnitude which would revolutionize existing views. This demonstration marked the birth of a new science to which the term endocrinology, introduced by Sir Edward Sharpey-Schafer, has been by common consent applied. Lines of inquiry were thereby initiated which have had a far-reaching effect upon neurology. Information of the greatest value has been obtained by consequent research not only as regards the influence of the sympathetic in relation to the emotions, defence mechanisms and so on, but regarding reproduction, growth and metabolism generally. Bonds have thereby been established which bring neurology into the closest touch with general medicine. As an endocrinologist said to me only the other day, "It is indeed difficult to say where neurology ends and endocrinology begins."

A new element may be said to have been introduced by von Economo, who initiated a novel line of approach when, in 1921, he postulated the conception of the encaged virus which gains access through the olfactory terminals of the nose, remains encaged within the nervous system and may produce periodic recurrences of symptoms or a progressive degeneration of the nervous structures. This is a hypothesis which goes far to explain the course of the disease in many cases of lethargic encephalitis and is also applicable to the late results of a spirochætal infection. I would quote in this connection the words of the late James Collier who, in referring to shingles in last year's brilliant Harveian oration, remarked: "In the case of one encaged virus—that of herpes zoster—it seems clear that a local lowering of vitality of part of the nervous system by reason of injury, exposure to cold, arsenic administration and other causes, may break the encagement, and the virus discharges outwards along the debilitated nerve to flower upon the skin in the characteristic shingles, and that flowering upon the skin is the only means of continuing the species and infecting other members of the community. After that flowering the virus within the nervous system dies, as does the annual plant in the garden after its flowering."

The deficiency or deprivation diseases of necessity interest the modern neurologist. It has long been known that beri-beri, pellagra and tetany were deprivation diseases and it has now been proved that subacute combined degeneration of the spinal cord, which is often, but not always, associated with anæmia, is of similar causation and may be benefited and perhaps prevented by appropriate treatment. The suggestion has also been advanced, although no proof has as yet been provided, that a deficiency factor may be responsible for disseminated sclerosis. It is not improbable, too, that in certain cases of peripheral neuritis the etiology is similar.

Of recent years the respective rôles of the sympathetic and parasympathetic nervous system have been the subject of much research, and information is rapidly accumulating as to the disturbances which result from interference with one or other of these two sources of nerve supply to the various organs of the body.

But it is to chemistry that the neurologist must turn his attention in his search for the solution of many of the etiological problems which confront him. Many years ago T. R. Elliott suggested that the resemblance between the effects of sympathetic nerves and those of adrenaline might mean that sympathetic impulses released small quantities of adrenaline, or something like it, in immediate relation to the effector cells, which would give the same responses as to adrenaline artificially applied. Important revelations have been established, as Sir Henry Dale points out in his first Dixon Memorial Lecture, by a pursuit of this suggestive line of approach. It is now, indeed, generally admitted that parasympathetic effects are transmitted by the release of a substance known as acetyl-choline and sympathetic effects by the release of a substance related to adrenaline, while there is evidence to indicate that a chemical mechanism of this kind also effects the transmission of nervous activity at the synapses in peripheral autonomic ganglia and at the motor nerve endings on voluntary muscle fibres. These observations which revolutionize our views on the conduction of nerve impulses open up new view-points *inter alia* in relation to the myotonias, myasthenias and myopathies and various pharmacological problems.

Recent advances clearly indicate that the relationship between neurology and general medicine becomes progressively more intimate. On the one hand, neurology must be regarded as a specialty, but looked at from a wider view-point it may be said to constitute an integral part of general medicine. The inseparability of neurology and general medicine becomes still more apparent when the functional disorders of the nervous system are included.

THE NEUROSES

Disease manifests itself in the disturbances of function which are designated as symptoms. The nervous system is concerned with the functioning of all the organs of the body and its symptomatology is consequently protean. At one time it was very generally believed that all disease and disturbance of function in the nervous system might be proved to be associated with visible changes of structure, but before long it was realized that the microscope had its limitations and that in some disorders obvious visible lesions were neither met with nor indeed to be expected. Thus it was that the diseases and disorders of the nervous system came to be classed in two groups—the " organic " and the " functional "—according to the presence or absence of visible changes in the tissues.

As time went on it became apparent that many of the " functional " disorders were determined by disordered action of the mind or of the emotions and to these disorders the terms " neuroses " or " psycho-neuroses," or the popular word " nerves," came to be applied in order to distinguish them from the true mental diseases or insanities. But experience showed that the symptoms of the neuroses, the paralyses and fits to mention gross examples, often very closely simulate those met with in the organic diseases. Correct diagnosis was of great importance both in relation to prognosis and treatment, and it was only natural that the neurologist, the expert on the organic diseases of the nervous system, should devote special attention to these problems in differential diagnosis. Hence it was that he acquired a particular experience of the neuroses, and became by a natural process of evolution the recognized authority to whom the practitioner applied when he required help in cases of the kind.

The neurologist was not, however, content to restrict his activities to the differential diagnosis between the neuroses and organic disease for, realizing that rational treatment demands an appreciation of the responsible etiological factors, he applied himself to the problem of the nature of the neuroses. Charcot did more than anyone to create an interest in these disorders, and in the 'seventies and 'eighties of last century he was constantly demonstrating to physicians drawn from all parts of the world the dramatic influence of suggestion. Dubois and Dejerine studied the symptomatology of the neuroses in detail, and described and advanced reasoned explanations to account for the symptoms of neurosis referred to the various organs of the body. They established indeed the scientific study of the neuroses and Dejerine founded what he well described as "a rational treatment" for these disorders. Nowadays the neurologist is not satisfied when he has excluded organic disease; he is not content indeed until, just as in cases of organic disease, he has made every attempt both to discover the causative factor and to account for the character and distribution of the patient's symptoms. His experience in dealing with these cases has taught him, or should have taught him, to look at every case from the patient's point of view and to recognize the patient's fears and dreads. He corrects the patient's misconceptions and allays his anxieties; he does not send him away telling him that there is nothing the matter, but explains to him the way in which his symptoms have come into being. Thus it is that the patient is reassured and as his attention is drawn away from symptoms they gradually, so to speak, fade out of consciousness.

RECENT ADVANCES IN THE TREATMENT OF NERVOUS DISEASES

By MACDONALD CRITCHLEY, M.D., F.R.C.P.

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UNFORTUNATELY, neurology is a subject in which impressive therapeutic achievements are somewhat unfamiliar. Nevertheless the recent years have witnessed some definite progress in treatment, at the hands of both research workers and empiricists. Five neurological disorders may be singled out as being affected by these recent advances in treatment.

NARCOLEPSY

Whatever its relationship with epilepsy, narcolepsy fails to respond in a comparable fashion to luminal or bromides. There is now a widespread agreement that ephedrine is the most useful measure we possess in its treatment, and either the sulphate or the hydrochloride may be employed. In mild cases doses of ¼ grain may be prescribed in the morning and at midday; in order to secure a satisfactory night's sleep, it is perhaps advisable not to administer ephedrine too close to the patient's bed-time. When the case is more serious, larger and more frequent doses of ephedrine may be ordered. Many believe that the action of this drug is enhanced by the use of caffeine, in 5-grain doses twice daily.

MIGRAINE

Three measures may be mentioned as frequently of the greatest value in the relief of an attack of migraine. A hypodermic injection of adrenaline (1/1000 solution) ♏ iii—v is often successful. Still more efficacious at times is an injection of femergin (Sandoz), which is a proprietary preparation of ergotamine tartrate. The dosage advisable is 0·25 c.cm. for the first time of administration, but on subsequent occasions 0·5 cm. may be given. At times, vomiting, uterine colic and other symptoms may follow injection. A third measure which may be reserved for the most severe cases of migraine, is the intravenous injection of sodium luminal (grains 3, dissolved in 12 c.cm. of sterile water).

SUBACUTE COMBINED DEGENERATION OF THE CORD

This is now known to respond better to modern treatment than was the previous experience. It was commonly taught that liver therapy—while beneficial to the associated anæmia—failed to relieve the neurological complications. We now believe that liver therapy, if given in very large quantity, may also be followed by improvement in some of the nervous signs and symptoms. As few patients can tolerate larger amounts of liver than ½ lb. daily, extracts will be needed. Experience has shown that the parenteral administration of pressure-extracted liver preparations offers the best prospects. Thus we may prescribe injection of campolon (Bayer) in doses ranging upwards from 2 c.cm. on alternate days. Actually, considerably larger doses may be employed, and 6 to 8 c.cm. on alternate days is frequently ordered.

Intensive liver treatment should be maintained even when the erythrocyte count has attained or exceeded normal figures.

It is often desirable to combine liver extracts with fresh lightly-cooked liver, so as to total the equivalent of 1 lb. daily. Instead of the fresh liver, extracts of hog's stomach may be prescribed. Here again large doses are required, such as 30 to 40 grammes daily.

Some authorities strongly advocate massive doses of iron. While this form of treatment may be a valuable adjuvant to liver extract, it should not replace the campolon injections. Blaud's pill may be ordered in doses up to 150 grains daily for two or three months.

After which the dosage may be reduced to 30 or 40 grammes daily.

For many years various observers have tended to associate subacute combined degeneration of the cord with the results of a vitamin-defective dietary. In the absence of precise knowledge as to the particular type of avitaminosis responsible, it is customary to prescribe a generous diet rich in all the accessory food substances. An abundance of fresh fruit and vegetables, meat, raw milk, eggs and cream must be ensured. In addition, concentrates of vitamin A may be ordered in the form of carotene, and of B_1 and B_2, in marmite or yeast. Vitamins A and D may be prescribed in adexolin capsules.

MYASTHENIA GRAVIS

A number of advances have recently been made in the treatment of this rare and disabling malady. First of these is the employment of ephedrine sulphate in ½ grain doses twice or three times daily. The value of this drug was first discovered empirically in 1930 by Dr. Harriet Edgeworth, herself a victim of the disease. Although most neurologists will confirm the efficacy of this drug, many are inclined to combine ephedrine with the administration of glycine. If the two drugs are to be given together the glycine should be prescribed in doses of 15 grammes twice daily; twenty minutes after each dose, ephedrine grain ⅜ or ½ should be taken. The total daily amount of ephedrine should not exceed grains 1½.

Yet another valuable therapeutic agent has recently been discovered by Dr. Mary Walker in the hypodermic injection of physostigmine salicylate. More recently the synthetic prostigmin (La Roche) has been substituted. In the former case, doses of 1/50 grain may be given. The improvement is immediate and often dramatic, but usually wears off in four or five hours. There is no objection to a daily injection of this drug;

oral administration, in doses of 1/30 grain, may be tried, but the effect is slight only. Injections of physostigmine in larger amounts may be of the greatest service in the emergency treatment of the dangerous respiratory crises. When the isomer prostigmin is chosen, dosages of 0·5—1·0 mg. (i.e. 1—2 c.cm.) may be employed in the form of hypodermic injection.

More recently still, the oral administration of potassium chloride has been suggested as a useful adjuvant. Large amounts are necessary, such as 4 to 6 grammes, dissolved in half a tumbler of water, and taken six times daily. The use of this drug leads to diuresis, and occasionally to vomiting and diarrhœa.

MUSCULAR DYSTROPHY

A good deal of interest has been recently attached to the employment of glycine in this disorder. For years it has been known that alterations in creatine metabolism are the rule in cases of myopathy. Three or four years ago it was found that these changes are temporarily adjusted when the patient is taking regular doses of glycine. At the same time a considerable clinical improvement was claimed.

Since the original publications on the subject, a number of records have appeared from all over the world dealing with the results of glycine medication. Although considerable divergencies of opinion have resulted, the majority vote would seem to support the contention that glycine does produce a certain amount of betterment in the muscular strength and general condition—although less than originally claimed. The word " cure " is certainly quite inapplicable.

Glycine is usually prescribed in doses of 15 grains daily. A less expensive though unpalatable method of prescription is to order gelatin; 80 to 100 grammes of gelatin, boiled down to a jelly, may be given daily; the glycine content is approximately 15—25 per cent.

RECENT ADVANCES IN TREATMENT ASSOCIATED WITH THE ENDOCRINE GLANDS

By E. C. DODDS, M.V.O., M.D., D.Sc., F.R.C.P.

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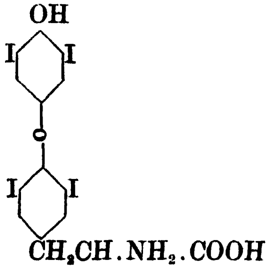
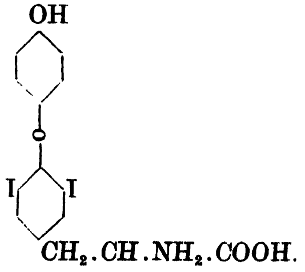
THERE is no branch of research which has added more in recent years to medicine than that of endocrinology, and there has been no branch of investigation which has been pursued more intensively, not only in this country, but also throughout the world. The present article will be confined to some recent developments with regard to the thyroid gland, some hormones of the anterior lobe of the pituitary, the sex hormones and the suprarenal cortical hormone.

THYROID GLAND

It will be remembered that the thyroid gland, from the historical point of view, can be regarded as the first hormone of internal secretion to be established as such. Myxœdema was discovered by Sir William Gull in 1873 and it was recognized in 1883 that removal of the thyroid gland was associated with myxœdema in the human subject. In 1891 Murray discovered the successful treatment of a case of myxœdema by the administration subcutaneously of a glycerin extract of the thyroid gland of the sheep. It was not, however, until some 24 years later, in 1915, that Kendall isolated the active principle of the thyroid in the form of a crystalline compound which he called thyroxine. The constitution of this substance was proved by analysis and synthesis by Harington and his co-workers in 1927. Until Harington's method for the preparation of this compound was available, clinical experimentation with thyroxine was impossible. The advantages of possessing a crystalline organic compound for therapeutic use cannot be over-estimated since there are great difficulties in assessing the biological activity of the ordinary thyroid extract. It was felt, therefore, that as soon as thyroxine became available valuable results would be obtained and it would eventually replace the British Pharmacopœial extract of the thyroid gland. Unfortunately it was quickly recognized that its almost complete insolubility in neutral or acid media rendered its action by mouth uncertain and that it was in no way suitable as a substitute for the thyroid extract. Harington has recently prepared a new derivative of thyroxine, 3 : 5-di-iodo-thyronine which has the same action as thyroxine and, although it is not so powerful, possesses the desirable quality of greater solubility in water and can be used with considerable success in clinical medicine. This substance merits a thorough clinical trial in preference to thyroxine. The chemical relationship existing between thyroxine and 3 : 5-di-iodo-thyronine is shown by the following formulæ :—



Thyroxine



3 : 5–Di–iodo–thyronine.

PITUITARY GLAND

The anterior lobe of the pituitary gland has been investigated with great intensity in recent years. The following hormones have been proved beyond all *question to be produced by this gland: (1) Gonadotropic hormone. (2) The growth hormone.* (3) Thyrotropic hormone. (4) Lactation hormone. (5)

Pancreaticotropic hormone. (6) Adrenotropic hormone. (7) Parathyrotropic hormone. Of these the only ones of immediate practical importance are the gonadotropic and thyrotropic substances.

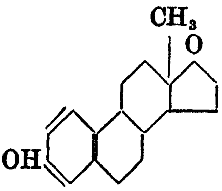
• *The gonadotropic hormone.*—It will be recalled that if an animal be hypophysectomized before the age of puberty, secondary sexual characteristics fail to develop, while administration of an extract of the anterior lobe of the pituitary gland will induce premature puberty in immature animals. Thus descent of the testes together with the appearance of the secondary sexual characteristics and spermatogenesis in the male and activation of the ovary with the formation of ova, corpora lutea and corpora hæmorrhagica in the female are due to the cyclical activity of the anterior lobe of the hypophysis. The hormone necessary to produce all these changes is prolan. It appears that the anterior lobe of the pituitary contains a hormone capable of stimulating either ovary or testes. Prolan is also excreted in the urine during pregnancy in large quantities and its presence in the urine is the basis of the well-known Aschheim-Zondek reaction for pregnancy. Prolan is a complex protein substance which can be obtained in a stable form from the urine of pregnant women. If such a solution of prolan be injected subcutaneously into immature female mice, puberty is produced in a relatively short time as shown by opening of the vagina and formation of corpora lutea and corpora hæmorrhagica in the ovaries. In immature males descent of the testes, spermatogenesis and enlargement of the external genitalia occur. Prolan has been used extensively for the treatment of various gynæcological and other disturbances. It has been recommended for use on the grounds that its injection will be followed *by stimulation of the follicles for the production of* corpora lutea and this will have the effect of reducing certain types of menorrhagia and that it may possibly result in the cure of habitual abortion. A careful study of the literature, however, fails to reveal any conclusive or incontrovertible evidence for the activity of prolan if thus administered to the human subject. To the writer its use in habitual abortion appears illogical, since there is no evidence that the normal urinary prolan of pregnancy is diminished in this condition. Again, arguing on the body-weight basis, it would appear very doubtful if a sufficient quantity has been given in the past to produce a demonstratable effect in a woman of, say, 70 kilogrammes weight. Great success has been claimed in the treatment of undescended testes with prolan and several successful cases have been reported by Spence and Scowen, following the injection of 500 rat units of prolan intramuscularly twice a week. Prolan is at present an unproven remedy in the hands of the physician but it is difficult to believe that such an active substance will not eventually find suitable employment. As in the case of the other sex hormones the question of dosage is very important and perhaps the use of greater doses may give more uniform results.

One of the greatest advances in modern medicine has been the establishment of accurate methods of diagnosing pregnancy. This has been accomplished through the labours of Aschheim and Zondek and as already pointed out depends on testing the suspected urine by injecting it into immature female mice. If the patient be pregnant the reaction will be positive as shown by the presence of corpora lutea and corpora hæmorrhagica in the ovaries.

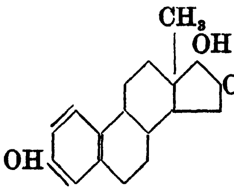
Thyrotropic hormone.—The thyrotropic hormone is produced by the anterior lobe of the pituitary gland and is responsible for the normal activity of the thyroid gland. If the anterior lobe of the pituitary be removed the thyroid shows degenerative changes.

Injection of an extract of the anterior lobe produces a condition in animals very similar to Graves' disease in human beings, namely, an increased basal metabolic rate associated with tremor and exophthalmos. At present little clinical work has been carried out, but there is little doubt that in the future stimulation of the thyroid in certain conditions may be effected by means of this substance. It is interesting to note that Collip and his co-workers have shown that certain hormones are capable of giving rise to a form of anti-substance and that an anti-thyrotropic substance can be prepared. This compound may possibly be capable of reducing the activity of the thyroid gland in certain types of Graves' disease and further clinical experimentation on such lines will be of the utmost importance.

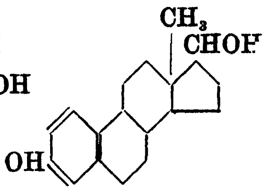
Sex hormones.—During the past few years the whole question of the sex hormones has undergone a complete revolution, thanks to the labours of the biologists and organic chemists. It is now possible to control completely the uterine cycle of menstruation in the human subject. The hormone of the ovary is responsible for the various secondary sexual characteristics of the female including cyclical changes such as œstrus in the lower animals and the menstrual cycle in the high primates. This substance is also excreted in large quantities throughout pregnancy and this fact made possible the elucidation of its chemical constitution. It appears in the urine of pregnancy mainly in two forms, œstrone and œstriole (keto-hydroxy-œstrin and trihydroxy-œstrin). Œstrone is many times more potent than the trihydroxy-œstrin as shown by its power of producing œstrus. It is possible to prepare another substance from keto-hydroxy-œstrin by partial hydrogenation. The addition of two atoms of hydrogen to the hydroxy-compound results in the formation of a compound called œstrin-diol of the following formula which is some five times as potent as the hydroxy-ketone :—



Ketohydroxy–œstrin



Trihydroxy- œstrin



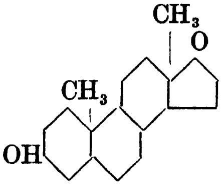
Œstrin-diol.

It is interesting to note that this substance has recently been prepared by Doisy and his co-workers from the normal urine of pregnancy in sufficient quantities to determine its constitution. There appears to be considerable evidence to show that the naturally occurring material is the partially hydrogenated substance. It is possible to manufacture certain esters of these compounds and to-day the benzoates are employed for clinical purposes.

In the cycle of higher primates it is known that at least two hormones are concerned, namely, the œstrogenic hormone and also the corpus luteum hormone. The latter substance was first isolated as an alcoholic extract of the corpus luteum. It was found that by injecting it into animals previously injected with œstrin the characteristic progestational changes associated with pregnancy or pseudo-pregnancy could be produced. The constitution of this compound has been worked out and found to be a di-ketone, but unfortunately it can only be obtained from natural sources in very small quantities and lack of sufficient supplies of the corpus luteum hormone has hindered the progress of ovarian therapy. Recently, however, it has been shown that the corpus luteum hormone can be produced from the naturally-occurring sterol of the soya bean plant, known as stigmasterol. This possesses the same carbon-ring structure as the corpus luteum hormone with the exception that a long and complex side-chain is joined to the five-membered ring. By suitable oxidation this may be removed leaving a di-ketone with the same structure and activity as the corpus luteum hormone. The discovery of this method of preparation will undoubtedly result in the production of sufficient quantities of the corpus luteum hormone for clinical purposes.

By the injection of œstrin into ovariectomised rats and mice it has been possible to reproduce all the known phenomena of œstrus, and it is interesting to note that roughly ten times the quantity of material is required to produce œstrus changes in the rat as for the mouse. In other words, the amount of material bears a direct relationship to their respective body-weights. If larger animals be employed proportionately larger quantities of hormone are required. Comparatively recently the employment of such quantities of hormone would have been regarded as impossible but with the new developments in manufacture they are available. Through a series of researches by Kaufmann it has been possible to establish a therapy which will produce menstruation with clock-like regularity in completely ovariectomised women. In order to produce the complete menstrual period it is necessary to inject in addition to large quantities of the œstrus-producing hormone, thirty rabbit-units of the corpus luteum hormone. Kaufmann has shown that this kind of therapy may be used in the treatment of amenorrhœa, infantilism and menstrual disorders. He has published recently a number of interesting cases proving that kraurosis vulvæ can be greatly benefited by injections of large quantities of œstrin. The corpus luteum hormone has been used in the treatment of menorrhagia and habitual abortion.

Male sex hormone.—The first experiments reported on the subject of the male sex hormone, now known as androsteron, were the much-criticized observations of Brown-Séquard, who, it will be recalled, claimed he had produced definite changes in himself by injecting an extract of the testes. In view of present knowledge there can be little doubt that the results were entirely psychological. It has been known through the work of Pézard that injection of an extract of crushed testes into capons would result in growth of the head furnishings but it was not until comparatively recently that the investigations of Koch and his co-workers demonstrated that it was possible to prepare a stable extract of the testes which was capable of reproducing all the secondary sexual characteristics in castrated animals. The hormone is also present in small quantities in the urine of males. The constitution has been worked out and shown by Butenandt to be as follows :—



Male Sex Hormone.

It possesses therefore the same carbon ring structure as œstrin, but the rings are fully hydrogenated and in addition there is a methyl group between rings 1 and 2. Like the œstrus-producing hydroxy-ketone it is capable of hydrogenation to form the di-hydro derivative, namely dihydro-androsteron. This substance is considerably more active than androsteron. Again this substance can be prepared by the partial oxidation of certain cholesterol derivatives and in the near future will be available in large quantities for clinical investigation. Up to the present reports on its use indicate mainly that it has a tonic effect on the body in general and it has also been stated to have an effect on early cases of enlarged prostate.

THE SUPRARENAL CORTEX

The recognition that the suprarenal glands had a great influence over the body in general was first made by Addison when he described the disease that now bears his name. This, it will be remembered, is distinguished by progressive lassitude, low blood-pressure, pigmentation of the skin associated with destruction of the suprarenal glands. At the end of the last century biologists had demonstrated that the injection of an extract of the suprarenal gland caused rapid increase in blood pressure. This action was subsequently attributed to a compound contained in the gland which was afterwards named adrenaline. It is not proposed to discuss the therapeutic uses of this substance. Clinical experimentation with adrenaline indicated quite early on that this compound was of no value in the treatment of Addison's disease since its administration results only in a temporary rise in blood pressure and no effect can be observed on the weakness, lassitude and pigmentation of this condition. Further experiments with adrenalectomized animals also proved that the administration of adrenaline was quite incapable of prolonging the lives of these animals.

Through the labours of Swingle and Pfiffner another hormone was isolated, from the suprarenal cortex, which is now generally known as "cortin." This has been used extensively in the treatment of Addison's disease. At present its chemical composition is unknown although it has been claimed that it has been isolated in a crystalline form. It is administered by subcutaneous injection and the following results have been described. In general the symptoms of Addison's disease may be relieved by means of this substance. It has frequently been reported, however, that while the symptoms may be relieved the patient dies from an extension of the tuberculous process which originally destroyed the suprarenal glands. There is no doubt, however, that patients with Addison's disease should be submitted to a thorough course of treatment with this hormone.

In the few preceding pages a general account has been given of recent advances in the value of products of ductless gland origin. No attempt has been made to give details which will be found in the references at the end of this article. It is clear that research workers in the field of organic chemistry and biology have succeeded in placing an entirely new set of weapons in the hands of the clinicians. Most of these, as those of the sex glands, have been definitely proved to be of value, while others such as the thyrotropic hormone are at present still undergoing trial. There can be no doubt that in the near future, when the discovery of simpler methods of preparation and purification have made them available in even greater quantities, hormones will be found to have an even wider range of application.

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RECENT ADVANCES IN THE TREATMENT OF HEART DISEASE

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IMPORTANT progress has been made in the treatment of chronic heart disease as a result of both medical and surgical advances. The scope of the surgeon in heart disease, however, is still narrow. For the majority of cardio-vascular patients drugs and rest are the most important therapeutic measures employed. But to-day, with the increased knowledge of anæsthetics, with the suitable preparation of the patient, and also by careful selection of material, the surgeon may play an increasingly important part in the treatment of such conditions as thrombo-angiitis obliterans, Raynaud's disease, angina pectoris and even congestive heart failure. There are, however, several important drugs which are being increasingly used in various forms and which are extremely valuable in the amelioration of such serious symptoms as the œdema of advanced congestive failure and the pain of angina pectoris.

As far as possible the term "recent" is taken to mean a period of five years (i.e. 1930 to 1935), but the subject of hypertension is not referred to here, as it was fully discussed by C. Hoyle[1] in the October, 1934, number of *The Practitioner*.

AURICULAR FIBRILLATION

Digoxin.—In 1785 Withering[2] recorded his observations on the value of digitalis in the treatment of cases of heart disease. The treatment of auricular fibrillation was put on a rational basis by the experimental work of Lewis[3] in this country on the mechanism of fibrillation and on the pharmacological action of digitalis. In addition to digitalis, strophanthus has also been employed, usually by intravenous injection, with disappointing results, as it has been found to be far less certain in its action, particularly when employed as an emergency measure, e.g. in fibrillation with a high ventricular rate.

Digoxin, a pure glucoside of digitalis, prepared from the Austrian foxglove, *Digitalis lanata*, has been fully tested by Wayne.[4] He has shown that it is absorbed and eliminated more rapidly than digitalis, and it has given uniform results. Digoxin can be given intravenously or by the mouth. Its administration by the intravenous route is indicated only in those patients with a high ventricular rate and urgent congestive failure, or in whom vomiting is a prominent and troublesome symptom. The dose is 0·75 to 1·00 mgrm., and this can be followed after an interval of 4 to 6 hours by digoxin given by mouth.

The majority of patients, however, can be treated by the oral administration of digoxin. The initial dose, depending upon the body weight of the patient, is 1·00, 1·25 or 1·50 mgrm. (4 to 6 tablets each containing 0·25 mgrm.), followed six hours later by 0·25 mgrm., and then the same dose every six hours until the ventricular rate falls to 60–70 per minute. The main indication for the use of digoxin appears to be for those patients with auricular fibrillation, in whom a high ventricular rate is present with or without congestive failure, and in whom a rapid response to treatment is required, i.e. in the type of case, in which strophanthus was formerly used intravenously or in which a massive dose of the tincture of digitalis, calculated on body weight, was employed.

Paroxysmal auricular fibrillation.—Attention has been directed to the frequency of attacks of paroxysmal auricular fibrillation by Parkinson and Campbell[5] who, as a result of their observations on a series of 200 cases, have discussed the etiology, symptoms, prognosis and treatment of this interesting abnormal rhythm. In the treatment of an attack, quinidine will often arrest the fibrillation, the initial dose being 3 grains, repeated to a maximum of 30 grains in a day. Digitalis should not be given early in an attack, because it is slow in its action, and also it may prolong an attack. For the prevention of the attacks, quinidine can be used in doses of 5 grains t.d.s.; this appears to be the best remedy available, but if quinidine fails and the attacks are unbearable, digitalis should be given, the optimum dose being 30 minims of the tincture daily.

Hurxthal[6] published the results of his experience in 59 cases of post-operative paroxysmal auricular fibrillation, who had been the subjects of hyperthyroidism. He found quinidine to be uniformly successful in cases of this type, and by comparing the action of this drug with that of digitalis found that digitalis was less successful in stopping the paroxysms. Hurxthal advocated a test dose of 3 grains, followed by doses of 6 grains two-hourly; he claimed that this amount was more practical, no more dangerous and saved time.

HEART BLOCK

Ephedrine has a similar action to adrenaline, but has a more prolonged effect. In view of this similarity, and because it was known that adrenaline sometimes exerted a beneficial action on Stokes-Adams' seizures of heart block, Stecher[7] in America in 1928 employed ephedrine in one such case with the complete relief of the syncopal attacks and convulsions; the dose that he used was ½ grain t.d.s. Gilchrist,[8] more recently, in this country found this drug of considerable value in this type of case. He recommended as the appropriate dose the minimum quantity required to cause acceleration of the resting ventricular rate; this worked out, on an average, at ½ grain every eight hours.

CONGESTIVE FAILURE

Salyrgan has almost entirely replaced novasurol (merbaphen) as a diuretic, because of the serious toxic reactions that not infrequently followed the use of the latter. Salyrgan is a complex mercury salt but it is relatively non-irritant. A word of warning is necessary here against the tendency to use it in every case of congestive failure in the place of milder diuretics, such as diuretin and theocin; it must be remembered that it is a powerful drug, and its use should be limited to the type of case indicated below. Salyrgan is given by intravenous injection, and the initial dose is 1 c.cm.; this is followed by 2 c.cm. every four days. Its diuretic effect is intensified by giving ammonium chloride 15 to 30 grains t.d.s. by mouth, though this is not absolutely essential. Bedford[9] gives the following as the three main indications for its use:—(i) Gross congestive heart failure of recent onset; (ii) chronic congestive failure if persistent; and (iii) adherent pericardium with ascites or pericardial effusion.

ANGINA PECTORIS

Glucose.—Meyer[10] in Germany in 1925 administered glucose intravenously to patients with various types of heart disease, and found that it had some therapeutic value. In 1931 Eggleston and Weiss[11] in America recommended its use in cases of angina pectoris; they gave 30 c.cm. of 1 per cent. solution intravenously, increasing the amount gradually to a maximum of 150 c.cm. of 20 per cent. solution. They gave the glucose three times a week and found that for satisfactory results the treatment might have to be continued for six weeks, but that when improvement was secured this often lasted for a long time. In this country Shirley Smith[12] advocated the use of insulin and glucose in cases of congestive failure and for anginal pain. The dose used was 5 units of insulin followed by 30 gm. of glucose. Six patients having anginal pain as the prominent symptom all improved, and the pain became less severe.

Glyceryl trinitrate.—For many years it has been known that amyl nitrite and liquor trinitrini were two of the best drugs for the relief of angina pectoris. Evans and Hoyle[13] investigated the effect of these two drugs as well as of sodium nitrite, brandy, chloroform, carminatives and hypnotics on a series of 122 patients. They found that glyceryl trinitrate was the most reliable, bringing relief in 86 per cent. of cases. When glyceryl trinitrate failed, amyl nitrite was the most effective remedy. They directed attention to the method of administration, which is of considerable importance. Glyceryl trinitrate (trinitrin) should be given in doses of $\frac{1}{100}$ to $\frac{1}{25}$ grain in tablet form. The tablets should be chewed slowly and not swallowed. They act much better when dissolved in the mouth than when swallowed whole. The tablets are cheap, but deteriorate on exposure to air and heat, so that they must be used fresh (i.e. within two months of preparation). No harmful effects follow their use, and they can be taken whenever the anginal pain comes on, even as often as $\frac{1}{100}$ grain every quarter of an hour; they can be used freely over long periods of time.

SURGICAL TREATMENT

Cervical sympathectomy.—Jonnesco[14] in 1923 advocated cervical sympathectomy for certain conditions including angina pectoris. As a result of the clinical experience of many observers this operation has now been found to be a procedure of value for the relief of anginal pain in certain carefully selected cases, but the rationale of this treatment does not seem to rest on any firm physiological basis. Cervical sympathectomy has also been employed for cases of Raynaud's disease. Recently Lewis[15] has made extensive investigations of one variety of Raynaud's disease, and has greatly advanced the knowledge of this subject. This condition is due to a local spasm of the digital arteries, which react abnormally to cold. He has shown that the spasm is not vasomotor in origin, but is due to a direct action of cold on the vessel. Lewis and Landis[16] have studied the effects of cervical sympathectomy on two patients with severe Raynaud's disease, and have come to the conclusion that the relief is only partial and no more than is to be expected on the removal of the normal vaso-constrictor tone, which results from the operation.

Lumbar sympathectomy.—Telford and Stopford[17] of Manchester, performed the operation of lumbar sympathectomy on fifty occasions for thrombo-angiitis obliterans. They believed that it was the ideal method of treatment for this condition. They removed the second to the fourth ganglia of the lumbar sympathetic cord on both sides. More than 50 per cent. of their patients were greatly benefited, being free of pain and able to walk well; no harmful results followed the operation. Rock Carling[18] has recorded cases of thrombo-angiitis obliterans, intermittent claudication and acrocyanosis, showing improvement after lumbar sympathectomy.

Thyroidectomy.—In 1933 Blumgart, Riseman, Davis and Berlin[19] suggested total thyroidectomy for certain cases of heart disease. Blumgart, Levine and Berlin[20] had previously tried subtotal thyroidectomy, but this had produced only temporary improvement. The method of total extirpation of the thyroid gland was the outcome of research on the velocity of blood flow through the lungs and the perfecting of an accurate method of its estimation. It had been found that the velocity of the blood flow varied with the metabolic rate, being increased in hyperthyroidism and decreased in myxœdema. Complete removal of the gland was necessary to lower the metabolic rate sufficiently to slow down the blood velocity. The rationale of thyroidectomy in cases of severe heart disease was that it relieved the patient of the necessity for a rapid circulatory rate by lowering his metabolism to that of a myxœdematous patient. Total excision of the thyroid was carried out under gas and oxygen, the operative mortality being only 12½ per cent. The writers of this paper stressed that the operation should only be performed when ordinary medical treatment has failed. The types, in which it is recommended, are cases of arteriosclerotic heart disease with congestive failure or angina pectoris, cases of hypertension, and cases of old rheumatic heart disease with or without auricular fibrillation. Satisfactory results have been recorded from this operation in this country by Brenner and Donovan.[21]

Masked hyperthyroidism.—Attention has been directed to an important and interesting clinical picture by Towers.[22] These cases of masked hyperthyroidism frequently present themselves to the physician, complaining primarily of cardiac symptoms. The underlying cause, namely hyperthyroidism, may escape notice, and the patient may be thought to be a cardio-vascular case, unless this condition is known and recognized. A brief clinical picture may not therefore be out of place here, in order to help in the recognition of this group of patients, so that appropriate treatment may be instituted, when the occasion arises. The patients are usually females in the fifties, well-nourished and tending to be apathetic in disposition. The most constant symptom is palpitation, the basis of which is a simple tachycardia; this is almost always brought on by exertion or emotion, and usually relieved by rest. The physical signs are not very conspicuous, but are characteristic. The apex-beat is that of an over-acting heart, and is similar to that of a normal heart after exercise or emotion; it consists of a sudden impulse and often suggests enlargement of the heart; the first sound is abrupt. Extra-systoles, with a rapid heart rate, a condition rare in other diseases, suggests thyrotoxicosis. Paroxysmal auricular fibrillation occasionally occurs. On radiological examination the pulmonary arc is fuller than normal. The treatment for such cases is thyroidectomy after the usual medical premedication and preparation of the patient.

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RECENT ADVANCES IN TREATMENT OF GASTRO-INTESTINAL DISORDERS

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WHEN the advances of recent years in the treatment of gastro-intestinal diseases are reviewed, it at once becomes obvious that it is with the upper reaches of the tract that most progress has been made. As is, indeed, inevitable, rational therapy has been preceded by improved diagnosis and the two must therefore be discussed to some extent together.

GASTRITIS

It may seem strange that the diagnosis of gastritis which was seldom, if ever, mentioned to students fifteen years ago now holds pride of place in capturing the attention of the physician. With its resuscitation from the grave of discredited diagnoses has come a much clearer understanding of such diverse diseases as cancer of the stomach and pernicious or Addison's anæmia. Faber, who persistently thirty years ago championed chronic gastritis as a true morbid entity, was equally persistently ignored by the majority of the profession, and it is Hurst's energy and genius which have demonstrated its actuality and far-reaching importance. When in 1921 Bennett and Ryle published the results of their investigation of a hundred healthy students by means of the fractional test-meal they applied a stimulus to gastro-enterology which is still by no means spent. They showed that 20 per cent. exhibited a degree of free acidity which fell outside the mean curves. Of them, half were hyperchlorhydric and half hypo- or a-chlorhydric, and it is particularly with these 20 per cent. with whom this section is concerned. Individuals with normal acidity can withstand the many factors which tend to produce gastritis, usually indefinitely, but those who have excess of hydrochloric acid and still more in those whose gastric acidity is deficient, or absent, inflammation of the stomach is prone to arise and persist.

It seems probable that achlorhydria, or even achylia (i.e. complete absence of all the active principles of gastric juice), may occur as an inborn constitutional error, but it is quite certain that either condition may be acquired as the result of gastritis. In fact, hypochlorhydria may be observed to progress to achlorydria and upon this achylia may ultimately supervene. These terms are not to be regarded as diagnoses in themselves, neither are they to be considered as separate and distinct pathological findings. They represent in short progressive stages in the destruction of the functional integrity of the gastric mucosa. But this is only half the picture, for with sufficiently advanced atrophy of the secretory elements of the stomach the ferments hæmopoietin and neuropoietin can no longer be produced. When they fail pernicious anæmia and subacute combined degeneration of the spinal cord manifest themselves.

The most important causes of chronic gastritis in relation to treatment are as follows :—

(1) Dietetic, e.g. bolting of insufficiently masticated food, or the eating of excess of indigestible material such as bran, fruit skins, pips and in short " roughage ", the virtues of which have been inordinately extolled. Early morning tea in particular, and strong tea at any time, highly seasoned food, iced drinks, and above all, strong alcohol especially when taken on an empty stomach are potent factors in irritating the mucous membrane.

(2) Tobacco. Smoking before meals is clearly more likely to cause trouble than when the stomach is

protected by food.

(3) Sepsis in the mouth or sinuses. The presence of pyorrhœa, or of post-nasal discharge, is very common in cases of gastritis.

(4) Acute gastritis such as may be caused by food poisoning, or commonly by influenza. Chronic gastritis may supervene particularly in those whose gastric acidity was primarily deficient.

(5) In congestive heart failure and in uræmia gastritis is not only common, but often dominates the symptom complex.

It will be clear that patients whose gastric juice is deficient in acid must be more liable to damage from the microbial causes of gastritis by virtue of the deficiency of a normal antiseptic. Again the mechanical irritants referred to will produce erosions which will act as portals of entry of the numerous organisms swallowed with the food and which escape destruction in the absence of a healthy gastric juice.

The question naturally arises as to the manner in which the hyperchlorhydric subject is also susceptible to gastritis. Here, it is true, there is plenty of antiseptic juice, but the mucosa is especially vulnerable to mechanical trauma in that once an erosion is produced healing is greatly delayed because of the high percentage of hydrochloric acid present. The result is commonly, therefore, the establishment of a peptic ulcer. The well-known hypermotility of the very acid stomach must be another factor in delaying healing and the secondary development of a true gastritis.

If the frequency of chronic gastritis be accepted, an interesting and important light is shed on the subject of carcinoma ventriculi. A common teaching in the past was that cancer of the stomach is almost invariably associated with achlorhydria, yet all of us have seen examples in which the reverse is the case. Hurst's hypothesis, which certainly explains the facts, is that primary carcinoma arises on the basis of a pre-existing gastritis and that the achlorhydria is evidence of the latter and never the result of the growth. On the other hand, in the relatively uncommon cases of malignant disease arising in a gastric ulcer, free acid is present in the gastric juice. It would appear that in so far as gastritis is avoidable by elimination of the causes enumerated, so also should the incidence of cancer of the stomach be capable of appreciable reduction.

Symptoms.—There may be no outstanding symptoms of chronic gastritis, though with careful history-taking it is rare to draw a complete blank. The commonest complaints are those of epigastric fullness and of eructation after quite small meals; loss of appetite especially for breakfast (this is due to the collection of mucus during the night); relief of nausea by vomiting; lassitude; furred tongue; unpleasant taste; loss of weight and disturbed sleep.

Signs.—There is usually diffuse soreness when pressure is applied to the epigastrium and occasionally there is hyperæsthesia of the overlying skin and subcutaneous tissue. The most helpful diagnostic point is the finding of an excess of mucus in each fraction of the test-meal. In advanced cases with atrophy of the gastric mucosa there may be no mucus but this will be associated with achylia and the danger of pernicious anæmia is imminent. The acid content is usually low in gastritis but this may be partly fictitious and the result of mucus blocking the mouths of the secretory glands. A decision on the point can be reached by repeating the test-meal after washing out the stomach. In apparent achlorhydria, acid may be produced by the injection of ½ mgm. histamine. If hydrochloric acid is not obtained in half to one hour the achlorhydria is true.

Treatment.—From the foregoing remarks it will be clear that treatment, except in the most advanced cases, can be efficacious. In the first place the causes such as alcohol, oro-pharyngeal sepsis and excessive smoking must be eliminated. Secondly, the stomach should be treated with a view to removing the excess of mucus and thus assisting the secretory glands to normal activity. This may be achieved by daily morning gastric lavage, using hydrogen peroxide (two drachms to the pint and increasing to half an ounce). After ten days a further test meal should be carried out and if this shows a reduction of mucus and increase of acid, the washing-out may be replaced by giving two teaspoonfuls of sodium bicarbonate in a pint of warm water to drink on waking. Good results have been obtained without lavage by giving four drachms of peroxide to the half-pint of water to drink. Some patients, however, cannot tolerate this as it may induce nausea. In any case, after ten minutes a further half-pint of warm water should be taken. Thirdly, when all evidence of gastritis has disappeared, the final state of the gastric juice must be considered. If left with a hyperchlorhydria it is well to give olive oil (two to four teaspoonfuls) before meals and 60 grains of equal parts of magnesium and calcium carbonate after meals and at bedtime. If diarrhœa supervenes the calcium salt should be proportionately increased. Milk should be taken in the middle of the morning and again at night. If, on the other hand, achlorhydria persists, the administration of twenty minims of dilute hydrochloric acid, well diluted and taken with food is advisable. In cases of persistent achylia a careful watch should be kept on the blood and central nervous system. The intramuscular injection of a concentrated liver extract such as hepostab (5 c.cm.) every fortnight may be regarded as a valuable precaution. Lastly, the diet should be free from alcohol, spiced food, salted foods, mustard, sauces, shell-fish, smoked meat or fish, pastry, new bread, food containing pips, skins, nuts, strong cheese, coffee and strong tea, iced food, salads (except in strict moderation) and the popular forms of roughage designed to relieve constipation. Food must be thoroughly chewed and meals must not be hurried. Warm water should be taken before breakfast: never tea.

PEPTIC ULCER

No great advances in the medical treatment of gastric and duodenal ulcer have been made in the last decade. The results of adequate rest, dietetic measures and alkalinization of the gastric contents are in the highest degree satisfactory. It has become generally recognized that the abolition of symptoms is only the first step in securing the healing of an ulcer, and that no patient can be regarded as satisfactorily treated who is not strictly controlled for six months, and who does not modify his life in the direction of careful choice of food, the taking of frequent small meals and the use of alkalies, especially at night, for the greater part of his existence. It has still to be more widely appreciated that bismuth and sodium bicarbonate mixtures are the least satisfactory medicines for peptic ulcer. Bismuth oxycarbonate has an action which is almost exclusively protective by virtue of the formation of a fine pellicle; its power of neutralization is low and quite out of proportion to its expense. Sodium bicarbonate, entrenched behind a rampart of centuries of popularity, produces more rapid relief of duodenal ulcer pain than any other alkali. On the other hand the rapid evolution of gas is undesirable, and furthermore the salt causes a considerable after-rise of acidity which annuls any earlier benefit. It is doubtful whether the treatment of gastro-intestinal lesions would suffer in any way if bismuth were no longer obtainable, but in deference to its slight value it may be incorporated in a powder consisting chiefly of the more stable carbonates of calcium and magnesium, and a small proportion of sodium bicarbonate may be added. The latter enhances the action by its rapid effect, and the carbonates prevent the late rise of acidity produced by the drug alone. Thus

Sod. bicarb.	1 part
Bismuth oxycarb.	1 part
Mag. carb.	3 parts
Calc. carb.	4 parts

form a useful powder for neutralization of gastric acidity. Doses of 60 grains thrice daily after food and at bedtime should be used for the first few weeks. Later, this dose should be given at bedtime and half the quantity after the main meals. In certain individuals diarrhœa will be produced by this powder. In such cases the calcium salt should be increased at the expense of magnesium component. Tribasic magnesium phosphate and tribasic calcium phosphate in equal parts in 30- to 60- grain doses have been shown by Hurst and his co-workers to have an even better neutralizing power. They are more expensive than the simple carbonates but should be used for patients who do not respond readily to treatment on the usual lines. One other point about medical treatment of peptic ulcer is the paramount necessity of insisting on drastic reduction, or complete abolition, of smoking. Relapses have been observed time after time in intelligent patients who have conformed to all the rules of treatment with this one exception. They start by allowing themselves one cigarette after meals. In a month they are smoking twenty. In three months melæna reminds them that the underlying ulcer diathesis is always ready to exact its toll if disregarded.

A patient who has had a duodenal ulcer cannot dodge all irksome restrictions, and probably the greatest advance in treatment has been the growing consciousness that surgery is not a simple short-cut to health. The hypermotile, hyperchlorhydric stomach which empties itself in half-an-hour cannot be expected to develop muscular and secretory placidity as the result of a gastro-jejunostomy. On the contrary, gastro-jejunal ulcer is only too prone to follow. In other words, if this operation be performed, the necessity for alkalinization and strict dieting is as great as ever. The procedure gives the most dramatically beneficient results in patients who suffer also from pyloric obstruction, but even here, if the gastric acidity is high, or becomes grossly elevated after the relief of the associated gastritis, much care in after-treatment is needed.

The indications for surgical treatment of peptic ulcer are :—

(1) Perforation.

(2) Pyloric obstruction which fails to improve on medical treatment.

(3) Adherence of ulcer to surrounding structures. The pancreas is most often involved and there is associated persistent severe pain in the epigastrium and in the back.

(4) Repeated hæmorrhage in spite of medical treatment.

(5) Hour-glass constriction.

(6) Persistent ulcer symptoms in spite of adequate medical treatment.

(7) If any suspicion of malignancy exists.

For the third, fourth, sixth and seventh indications, particularly for the fourth, gastro-jejunostomy is not the operation of choice. Partial gastrectomy, gastro-duodenectomy, excision or exclusion operations hold out a much greater hope of cure. The removal of a large area of the stomach has the advantage of reducing the subsequent output of acid. Extensive excisions may, however, be followed by microcytic or by Addisonian anæmia.

For some years past reports of remarkable cures of duodenal ulceration as the result of injection treatment have reached this country. It appears that the subcutaneous injection of certain amino-acids, notably histidine, hastens the healing of peptic ulcers and obviates the need for the strict regime hitherto imposed. It is too early to express an opinion on the matter, but it should be pointed out that experiments being carried out at Guy's Hospital show that in a given number of ulcer cases the injection of any inert substance is often followed by the disappearance of symptomatic and radiographic evidence of disease. This confirms, in short, what every physician knows that for years peptic ulcers tend to heal spontaneously whether treated or not. Gradually the attacks become more frequent and more prolonged, but whether in these later stages the injection of amino-acids will prove of benefit has yet to be proved.

CHOLECYSTITIS

A decided advance in the medical treatment of the chronically inflamed gall-bladder has been marked by the introduction of combined hexamine and alkali administration. Theoretically, hexamine should possess no antiseptic action in an alkaline medium, but Knott has shown that in infected bile formaldehyde is in fact liberated and may even result in its sterilization. It is essential that the urine should be rendered alkaline and maintained in this condition by the use of thirty or more grains of potassium citrate thrice daily before hexamine therapy (up to 80 grains daily) is started. Failing this precaution acute cystitis will arise. In mild cases of cholecystitis the treatment is encouraging, but in those with pronounced symptoms and abnormal cholecystograms recurrence is so frequent as to demand surgical extirpation.

The rationale of olive oil treatment is simply that this substance, when taken by the mouth, encourages drainage of the bilary tract. Starting with a teaspoonful before meals, the dose is raised to half or even one ounce. The oil is strangely enough well tolerated by these patients.

The cholecystogram has advanced diagnosis considerably, but a word of warning must be given. In the presence of flatulent dyspepsia, localized gall-bladder tenderness, possibly attacks of pain and of low fever, in short, when the clinical picture is that of cholecystitis, a report of a normal cholecystogram must not be taken as an indication of a normal gall-bladder. The interior of this organ may be macroscopically and the wall microscopically definitely abnormal yet functional integrity may be preserved sufficiently to avoid X-ray evidence of disease. Similarly it should be remembered that at operation the exterior of the gall bladder may appear to be normal and yet the organ may be the seat of chronic inflammation. In cases of doubt when the gall bladder, or for that matter the appendix, has been removed, the doctor should have sufficient moral courage to insist on a pathologist's report and not throw away the organ in the pious hope that histological vindication was present. With modern technique in cases of cholecystitis and chronic appendicitis X-rays afford the most valuable evidence of disease. Absence of, or incomplete, filling with opaque material is in either case suggestive, and localized tenderness, as demonstrated when screening, is conclusive evidence of disease.

THE COLON

Ulcerative colitis.—Advance in treatment has been in the negative sense. That is to say, it is now realized that all cases tend to recover from the initial attack, and the prognosis is worse with each relapse. As a consequence the heroic treatment of daily colon lavage with various irritants has given place to that of rest, a full but soft diet containing very little milk, warmth to the abdomen and opium by the mouth to secure rest and calm the colonic movement.

The treatment of acute infective diarrhœa in children by means of an exclusively apple diet was initiated in Heidelberg some years ago. For the last four years the same method has been employed in cases of acute ulcerative colitis. The most severe cases respond better than the comparatively mild ones. The daily diet consists of twelve medium-sized raw apples which have been freed from skin and pips prior to thoroughly pounding up so as to produce an uncooked purée. No other food or drink is allowed. In favourable cases the stools become less offensive in forty-eight hours and their number and consistency steadily improves. In a high proportion of patients there is associated chronic gastritis and achlorhydria. This should be treated as indicated earlier in this article, for by so doing there is a considerable chance of avoiding further attacks. Every case should in the quiescent interval be subjected to X-ray examination combined with a barium enema. The prognosis depends upon the amount of bowel involved. Complete recovery is common if only the iliac colon to the rectum is implicated.

Constipation.—It is sad to reflect that one of the greatest advances in the treatment of gastro-intestinal diseases is being obstructed by the reluctance of the patient to accept simple remedies in the place of unnecessary drugs. The discarding of irritating purgatives which encumbered pharmacopoeias, and their replacement by a natural diet, the occasional use of lubricants, and above all abdominal exercises such as sponsored by Hornibrook was a decided step in the right direction. The result should be that in the absence of organic causes (including muscular weakness from trauma, old age and the like) purgatives should scarcely ever be used. Instead of this the public still has to be treated more for excessive purgation rather than for constipation. A diet containing an adequacy of fruit and vegetables and free from excess of constipating substances, such as chocolate, pastry, cheese, tea and coffee does not need the addition of " roughage ". It is possible to over-irritate the alimentary tract with bran, husks and other residues. In any case, to attempt to stimulate the intestines with " roughage " and at the same time to render it bland by copious doses of paraffin is as illogical as the combined administration of caffeine and bromide.

If we look back on the subjects reviewed one outstanding fact is evident. It is that diagnosis of gastro-intestinal disease is now an exact science. The established methods of history taking and full examination can never be discarded, but in addition patients must be given the benefit of the perfected methods of modern investigation. It is these which have been responsible for the disappearance of the meaningless terms " indigestion " and " dyspepsia " with the inevitably associated bottle of medicine, and for their replacement by words of significance, and by treatment which gains in effectiveness at a rate unsurpassed in any other branch of medical art.

ADVANCES IN THE TREATMENT OF KIDNEY DISEASE

By T. IZOD BENNETT, M.D., F.R.C.P.

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IMPROVEMENT in the medical treatment of diseases of the kidney during the last few years has been due, more than to any other factor, to greater precision in diagnosis and earlier recognition of the conditions amenable to treatment. It is unhappily true that the cure of chronic Bright's disease remains far away and that no great step forward has been taken towards the elucidation of the etiology and mechanism of hypertension which is so closely connected with many of the more serious forms of renal disease. At the same time the progress of knowledge and the ever-improving standard of medical skill among practitioners has led to much commoner and earlier recognition of the acute stages of nephritis and in general to increased exactitude and more logical therapy.

In three directions advance has been notable:—(*a*) In the treatment of acute nephritis; (*b*) in the treatment of œdema; and (*c*) in the treatment of *B. coli* infections of the urinary tract.

ACUTE NEPHRITIS

It is now recognized that acute nephritis occurs in two main forms:—(*a*) Acute diffuse glomerulo-nephritis, and (*b*) acute focal nephritis. The latter group embraces a series of cases occurring in the course of various infections, such as pneumonia, typhoid fever, malaria and various streptococcal infections. Albumin, blood and casts are found in the urine and the disturbance occurs at the height of the infection. Often the causal organism can be recovered from the urine and the nephritis is due to the blockage of scattered groups of glomeruli by bacteria and their products. The outstanding feature is hæmaturia; œdema and hypertension are completely absent and the retina is not affected. It is the negative findings, even more than the positive ones, which enable diagnosis to be made; this is of importance because prognosis is invariably excellent.

True acute diffuse glomerulo-nephritis, on the other hand, when associated with an infective disease, tends to occur in the later stages of such diseases as scarlet fever or tonsillitis. In many instances no exciting cause can be traced, and œdema, blood-stained urine, or actual suppression may be the very first symptoms. Hæmaturia is usually less marked than in the focal variety and œdema and hypertension are common accompaniments. The prognosis is always a matter of anxiety, although, especially if treatment is thorough, a great number of cases clear up completely.

But whichever variety a case of acute nephritis may belong to the main lines of treatment at the outset are the same; the essential is to secure as complete rest for the kidney as possible. This is effected by keeping the patient for days, and occasionally for several weeks, on a diet which amounts practically to starvation. While it is clear that no chronic and debilitating disease can be treated by prolonged starvation, it has also become apparent that in many acute febrile conditions the optimum amount of food with which the body can deal is so limited that starvation becomes practically the logical treatment. This applies particularly to acute nephritis, for not only is it impossible to supply sufficient protein for maintenance without calling on the kidney for a considerable amount of work, but even the excretion of water can with advantage be restricted to the necessary minimum.

A good rule is to limit the fluid intake to an amount not exceeding, if possible, the amount of fluid excreted in the previous twenty-four hours. Often the tendency to suppression is such that only a few ounces are passed during the first few days; 15 to 20 oz. of fluid daily is about the limit to which the intake can be restricted without causing suffering to the patient, and this amount should be permitted even when the output is below that figure. In the days following, when recovery is in progress, there will often be a relative polyuria owing to the disappearance of an actual or masked œdema, and it is seldom wise to permit the fluids drunk to exceed 30 oz. even at this stage.

Food must be even more severely restricted. Protein cannot be given without throwing work on the kidney, carbohydrate must be restricted for similar reasons and can certainly not be given in amounts adequate for immediate maintenance, whilst fat is further debarred because of its ketogenic properties. A good rule is to restrict the food to fruit for the first three or four days at least and to limit this to a few small pieces of apple to be chewed at meal times; a hard fruit of this type has great practical advantage in that it tends to keep the mouth clean. When they realize the importance of the situation the majority of patients tolerate such restriction extremely well, and it becomes possible after a few days to add bananas and other fruit and to give a little barley sugar or other easily assimilated carbohydrate.

The principle of applying rest to the damaged kidney embraces the necessity of selecting a diet which is not productive of acidity in amounts calling for renal energy; fruit and vegetables are again indicated for this reason, while fats and proteins are contra-indicated. But in many forms of acute nephritis the infection itself tends to create a highly acid urine; each specimen passed should be tested with litmus, and if the diet is insufficient to counteract this tendency to excessive acidity alkali-producing drugs should be administered. Here potassium citrate justifies its ancient reputation; it is superior to sodium bicarbonate because the sodium ion is favourable to œdema formation, but if neutrality of the urine cannot be obtained by citrate alone, small amounts of sodium bicarbonate may be employed as well.

Acute nephritis is a disease calling for patience and optimism on the part of practitioner and patient alike, and it is particularly desirable that the patient and his friends should realize that chronic nephritis is so grave a disease that considerable sacrifices in the acute stages are more than justified if they hold out a promise of cure. All recent work tends to show that complete cure can be secured in an important proportion of cases and there is a general concensus of opinion that careful dietetic treatment at the outset is of great importance in securing this result.

In all cases of nephritis with a history of tonsillitis or evidence that the infection may have entered by the pharyngeal route, the question of removal of the tonsils or other septic foci must be borne carefully in mind; cases are often seen in which relapses of hæmaturia occur at frequent intervals, and when the kidney is subjected to repeated onslaughts of this type the tonsils should be removed even while the disease is still acute. The writer shares the experience of other authorities in having seen cases make a spectacular recovery when this has been done, and it is the duty of the physician to resist the hesitancy of anæsthetists and surgeons when confronted with such a situation.

ŒDEMA

There are probably three main groups of renal œdema :—(*a*) The masked œdema of acute nephritis; (*b*) the open œdema of acute and chronic nephritis; and (*c*) "nephrotic" œdema. The first of these is sometimes only demonstrable by means of the weighing machine and represents the natural consequence of partial or complete suppression of urine, the main lines of treating which have been described above.

The œdema of acute and chronic glomerulo-nephritis is probably due in part to increased permeability of the capillary epithelium permitting an undue passage of water and salts from the circulation into the tissue spaces, while "nephrotic" œdema is now generally considered to be largely the effect of disturbed osmotic balance between the circulation and the tissue spaces. Long-standing escape of large amounts of protein from the blood plasma through the kidney into the urine leads to a lowering of the colloid osmotic pressure of the blood, this being the force normally responsible for the return of water from the tissue spaces to the blood stream. The term "nephrosis" is applied to those cases with chronic albuminuria and a tendency to œdema formation in which there is no history of an attack of acute nephritis, no hæmaturia or epithelial casts in the urine, no increase in the blood pressure, and no retinitis; these must be sharply distinguished from the cases of true chronic Bright's disease in which the history or evidence of hypertension or renal failure prove that progressive damage to the kidneys is present.

The two groups must be kept carefully separate for many reasons. The prognosis of chronic Bright's disease is infinitely worse than that of nephrosis, and the treatment of chronic Bright's disease must include the elimination of septic foci and the adoption of such measures as are available for combating hypertension. In cases of long-standing Bright's disease the hypertensive factor may produce some degree of cardiac failure and consequently an œdema of cardiac origin, but in all cases in which it can be assumed that œdema in a case of nephritis is related to chronic albuminuria, and consequently to depletion of the plasma proteins, care must be taken that the diet contains as little salt as possible and that it is not too low in protein. The following is a diet suitable for such cases :—

BREAKFAST.—One orange or half a grape fruit. Small helping of porridge with very little skim milk. Steamed or grilled fish. Two slices of salt-free bread or biscuit. Marmalade or honey *ad lib.* Tea with skim milk or lemon, sugar if desired.

Luncheon.—An average serving of lean meat, fish, poultry or game. Vegetables, particularly peas and beans without salt. Cooked fruit with baked egg white.

Tea.—Two slices of salt-free bread with a scrape of butter and honey *ad lib*. Lettuce or fruit. Tea with skim milk.

Supper.—Omelette made with two whites and one yolk of egg or cold breast of chicken. Salad with vinegar or lemon juice. Two slices of salt-free bread. Fruit. Cocoa with skim milk.

Butter must be used in minimum quantities and must be salt-free; bread should be home-made without salt or Jewish unleavened bread may be used. The fluid intake should not exceed 30 ounces.

Such a diet may usefully be employed in all cases when there is a tendency to œdema. If œdema is present in sufficient degree to call for treatment *per se* a still stricter régime must be adopted. The patient should be kept under close observation and the volume of urine passed daily should be carefully noted, together with the volume of fluid taken by mouth; it is an easy matter for the patient to keep a diary which begins at breakfast time daily, the intake and output being recorded in parallel columns somewhat as follows:—

	Intake.		Output of Urine.
8.0 a.m.	Tea	8 oz.	
	Milk	2 oz.	
12 noon			10 oz.
1 p.m.	Gravy	1 oz.	
	Fruit-juice	2 oz.	
	Water	6 oz.	
3 p.m.			8 oz.
4.30 p.m.	Tea	8 oz.	
7.0 p.m.			8 oz.
7.30 p.m.	Fruit-juice	2 oz.	
	Cocoa	10 oz.	
9.30 p.m.			12 oz.
7.30 a.m.			14 oz.
Total		39 oz.	52 oz.

In this way the medical attendant can see day by day whether the œdema is really being mastered. If the water balance is favourable there is no need to employ stronger measures, but if progress is not satisfactory the course often takes a more favourable turn if certain diuretics are employed. The first of these to be tried should be potassium salts; a good formula being the following :—

℞	Potassium bicarbonate - - - -	15 grains
	Potassium citrate - - - - -	15 grains
	Water to 1 oz.	

An ounce of this to be taken six-hourly, four-hourly and two-hourly on successive days until the urine is fully alkaline.

If the œdema remains obstinate in spite of this treatment recourse may be had to urea administration; this may be given in capsules of one gramme hourly for eight successive hours daily, but should not be employed if there is the least suspicion of nitrogen retention, and, in any case, observation of the blood nitrogen should be made from time to time.

In cases of pure nephrosis there is no objection to the employment of mercurial diuretics such as salyrgan. An initial dose of 0·5 c.cm. should be given either intramuscularly or intravenously, and if no ill-effect one, or even 2 c.cm. may be given every two days as long as œdema continues, and if a good diuresis is being produced by the drug.

Finally, it must be remembered that renal œdema of severe degree always carries with it certain definite risks to the patient; apart from the invalidity which it produces there is a constant risk that the œdema fluid may become infected and the patient may die of pneumococcal peritonitis or of spreading cellulitis. For this reason if none of the medical treatments indicated above has produced the desired effect recourse should be had to surgical measures of drainage. Probably the safest method is by means of a small horizontal incision about one inch long over each external malleolus of the ankle. The strictest aseptic precautions must be adopted and no local anæsthetic is necessary. The risk of infection is much less with a single incision of this type than if numerous punctures are made. The patient should remain seated in a comfortable armchair in order to promote drainage, and it is often possible when œdema has been reduced by this method to maintain the patient in a comfortable state by means of a salt-free diet and the administration of potassium salts.

INFECTIONS OF THE URINARY TRACT

Few diseases are commoner and more troublesome in general practice than the group which includes cystitis, pyelitis, and *B. coli* infections of the urinary tract in general. But it must further be recognized that a large proportion of patients with these diseases respond well to medical treatment if this is thoroughly and vigorously applied. Recent writers, such as Prof. A. Ellis, have reiterated the old teaching that thorough treatment by alkalies is successful in a satisfactory proportion of cases, particularly when the condition is acute. Many of the supposed failures of alkalies are due to insufficient dosage, the important principle is that sufficient should be given to make every specimen of urine alkaline throughout the twenty-four hours, and accordingly each specimen must be tested with litmus paper and the dosage adjusted so that the desired result is obtained. Potassium citrate and sodium bicarbonate are the drugs of choice, and it is better to give one of these in full doses rather than to employ mixtures which are more calculated to produce nausea or even vomiting.

℞	Potassium citrate - - - - -	60 grains
	Syrup of lemon - - - - -	30 minims
	Water to ½ oz.	

or

℞	Sodium bicarbonate - - - -	30 grains
	Infusion of gentian to ½ oz.	

Either of these prescriptions may be employed and should be given every two hours for eight doses and subsequently four-hourly or six-hourly according to the reaction of the urine. The use of these alkalies should, moreover, be continued for at least a month after all symptoms have disappeared and the patient is apparently well.

The last five years have seen the appearance of many articles on the subject of the employment of ketogenic diets for the treatment of this disease, and there is no doubt that this type of diet has given satisfactory results in a large number of cases. But it seems doubtful if the ketogenic diet is going to survive as a practical therapeutic measure because it is costly, unpalatable, and requires continuous supervision by a dietitian if it is to be properly employed. The following is a specimen menu for such a diet and has only to be critically examined to make the difficulties apparent :—

BREAKFAST.—Tea or coffee with or without sugar—1 dessert-spoonful cream. 1 egg—poached. 2 rashers bacon. 1 soya-bean muffin. 1 oz. butter.

LUNCHEON.—3 oz. grilled chop, well trimmed. Half cupful spinach mixed with 2 tablespoonfuls cream. 1 soya-bean muffin. 1 oz. butter. Pineapple fool; three tablespoons cream; 1 white of egg.

TEA.—1 bran cake. 1 oz. butter. Tea with 1 dessertspoon cream.

DINNER.—Tomato cream soup. (1 egg yolk; 2 tablespoons cream.) 2 rashers bacon and 1 oz. chicken liver, grilled. 2 bran cakes. 1 oz. butter. 8 or 9 stalks asparagus with 3 tablespoonfuls cream and a dash of lemon heated as sauce. 4 tablespoonfuls whipped cream, 6 prunes stoned and cut in pieces—well mixed.

More recently attempts have been made to produce the effects of ketogenic diets by the administration of chemical substances which will raise the proportion of keto-acids in the urine without the employment of such a drastic dietary. M. L. Rosenheim, who has particularly studied this subject, employs 3 grammes of the sodium salt of mandelic acid in an ounce of water, neutralized by the addition of 1·6 grains of sodium bicarbonate and flavoured with lemon. One ounce of this mixture is given four times a day, each dose being accompanied by two cachets containing one gramme of ammonium chloride in order to increase the acidity of the urine. In this way 12 grammes of mandelic acid are given daily, and good results are claimed. Care must be taken to watch the urine for signs of renal irritation, because occasionally cases show an increase in albumin, and casts have been found to appear; such findings call for the immediate cessation of this method of treatment. All the drugs necessary for this treatment, together with a convenient apparatus for testing the reaction of the urine, are now put up in a special outfit by British Drug Houses, Ltd.

From what has been written it is apparent that the ketogenic diet has hardly fulfilled its early promise. This fact should direct attention again to the treatment with alkalies and should serve as a reminder that cases resistant to alkalies are often complicated by unsuspected obstruction somewhere in the urinary tract. X-ray examination of a resistant case will often reveal some degree of retention in the renal pelvis or in the ureters, and when this diagnostic procedure is adopted indications for treatment, whether by relief of adhesions or by dilatation of particularly obstructed ureters, or other expert surgical procedures, often become apparent.

CONCLUSIONS

The three main sections of this article epitomize the more important advances that have been made in the last few years in the treatment of renal disease, but apart from these specific instances advances in knowledge have enabled us to reach much greater precision in diagnosis. Today it should not be a difficult matter in any given case to state whether uræmia, that is to say, true chemical poisoning due to renal failure, is present, or whether a case is one of pseudo-uræmia chiefly dependent upon hypertension; the many alarming cases of renal disease encountered during pregnancy can be divided into true examples of renal failure, infective cases lit up by pressure from the pregnant uterus, and the purely hypertensive. Treatment will be governed by the exact diagnosis in each case and, therefore, although it lies outside the scope of the present article, diagnosis remains of cardinal importance and diagnosis becomes an easier problem as the years pass by.

RECENT ADVANCES IN THE TREATMENT OF DIABETES

BY GEORGE GRAHAM, M.D., F.R.C.P.

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THE discovery of insulin by Banting and Best has enabled many patients to live, who otherwise would have died from two to five years after the onset of the disease. The knowledge gained as the result of looking after these patients caused an immediate improvement in the management of the diet, and during the last seven years the increase in the carbohydrate ration of the diet has resulted in further improvement in the condition of diabetic subjects. Two main problems arise in treatment, namely, the prevention of any abnormal variation in the blood sugar, and the choice of the best diet for the individual patient.

The task of discovering the dose of insulin which will be the means of keeping the blood sugar within normal limits throughout the day, is not easy. The estimation of the blood sugar is of great value and this should always be done in establishing the diagnosis, and if possible also in controlling the initial period of treatment. It is not practicable, or indeed necessary, to estimate the blood sugar very frequently during the course of treatment, but it is essential to know if it is within the normal limits. In this connection, the sensations of patients are notoriously unreliable, as they often feel well for some time after the blood sugar is above the normal limits. An approximate idea of the blood sugar may be obtained by testing the urine for sugar. Before the discovery of insulin patients were rarely taught to test their own urine because it usually contained sugar. Reliance was placed on the estimation of the total amount of sugar passed in the twenty-four hours, and this afforded a measure of the severity of the disease. A sudden rise in the sugar excretion of 20 to 50 gm. might be due to the presence of another illness, but it was often the result of the addition of carbohydrate to the diet. Under modern conditions it is rarely necessary to estimate the total excretion of sugar, except when the diagnosis is in doubt in cases of renal glycosuria. Patients are taught to test their own urine for sugar, which should be sugar-free, and its presence should be regarded as indicating an alteration of the dose of insulin. Some controversy still exists whether Fehling or Benedict's solution is the better for testing urine. Fehling solution is still used as the routine test by many doctors, and while it takes less time to determine whether sugar is present in large amounts, it requires considerable experience to ascertain whether a doubtful reaction is due to a small amount of sugar or to the presence of excess of glycuronic acid, uric acid, or creatinine. Benedict's qualitative test requires more time, but it has the advantage that it is not affected by the substances just mentioned, and is much easier to interpret, since a precipitate of any colour indicates sugar, whereas a mere change of colour without turbidity does not. Patients get tired of testing their own urine, and this should be made as easy as possible.

This may be done by placing the test tube in boiling water for five minutes. A small electric saucepan or shaving pot, a gas ring, or good spirit lamp in the bedroom enables the test to be carried out with the minimum of trouble while the patient is dressing for breakfast or dinner; a sand clock is of use in showing when five minutes has elapsed. A new bottle of Benedict's solution should always be tested with glucose or 10 drops of orange juice in order to make certain that the right solution has been supplied. It should give a green, yellow, or red precipitate, according to the amount of sugar present. Benedict recommended that 5 c.cm. of the solution and 8 drops of urine should be used. I prefer 3 c.cm. of the solution and 6 drops of urine, for this takes less time to boil, and also reduces the expense, which is an important item to some patients.

The time of testing is very important. If the

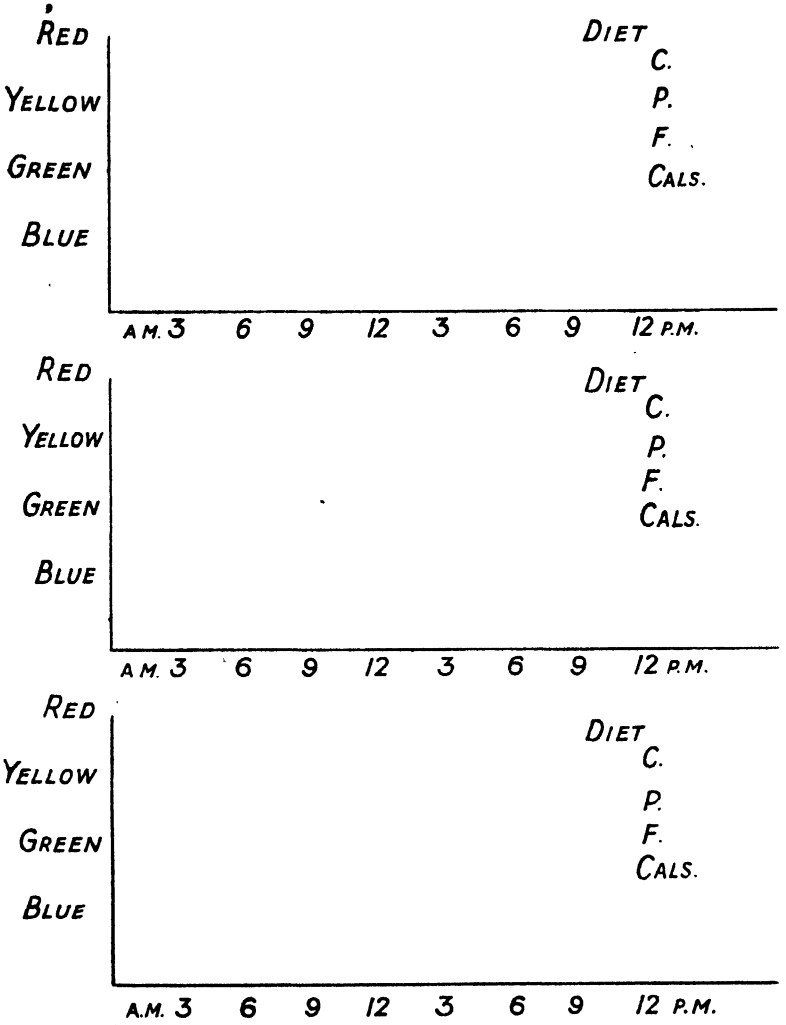

FIG. 1.—Chart for keeping the result of the urine tests.

patient is not having insulin, or only 5 units a day, the urine passed after the principal meal should be tested, since it is most likely to contain sugar; the urine passed before breakfast is always sugar-free in mild cases. The rule is reversed if the patient is having more than 5 units of insulin, and the urine passed before each dose should be tested because the blood sugar is usually at its highest at this time. When insulin treatment is being started, and whenever the patient is ill, or in coma, the treatment is made much simpler if each specimen of urine passed is tested for sugar. For this purpose, the day may be divided into four, six, or eight portions. At St. Bartholomew's Hospital the urine is tested every three hours approximately, and a special chart which takes seven days is provided (fig. 1).

This method enables the doctor to know when sugar is excreted (because of a raised blood-sugar), and when to increase the dose of insulin.

The study of the urine chart will show at once which dose of insulin should be altered (fig. 2). If the urine passed at 7 p.m. contains sugar, the morning dose of

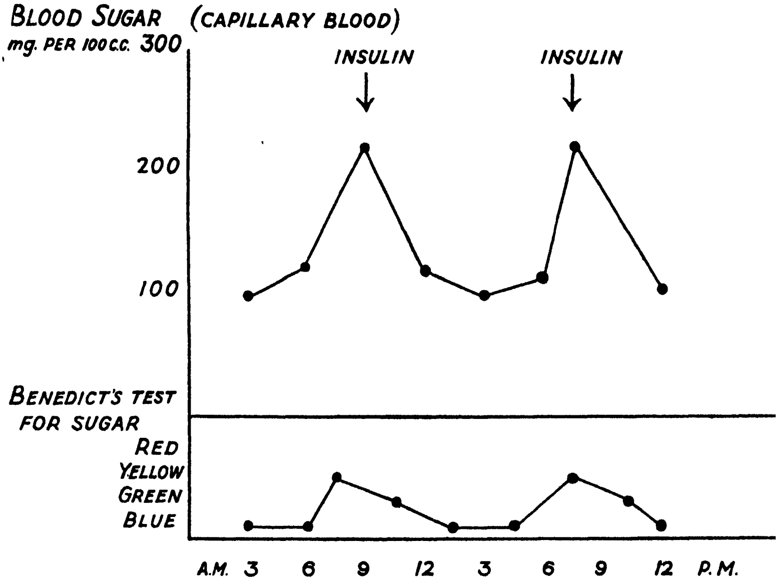

FIG. 2.—Shows the relation of the blood sugar to the sugar in the urine.

insulin was insufficient, and that on the subsequent day should be increased by 2 to 4 units according to the amount of the glycosuria. If the urine passed before breakfast contains sugar, the evening dose of insulin was inadequate, and that of the following day should be larger by 2 or 4 units. The patient should understand the relation of the morning insulin to the evening urine, and of the evening insulin to the urine of the next morning. This may be done by teaching him to keep a chart of the various data (fig. 3).

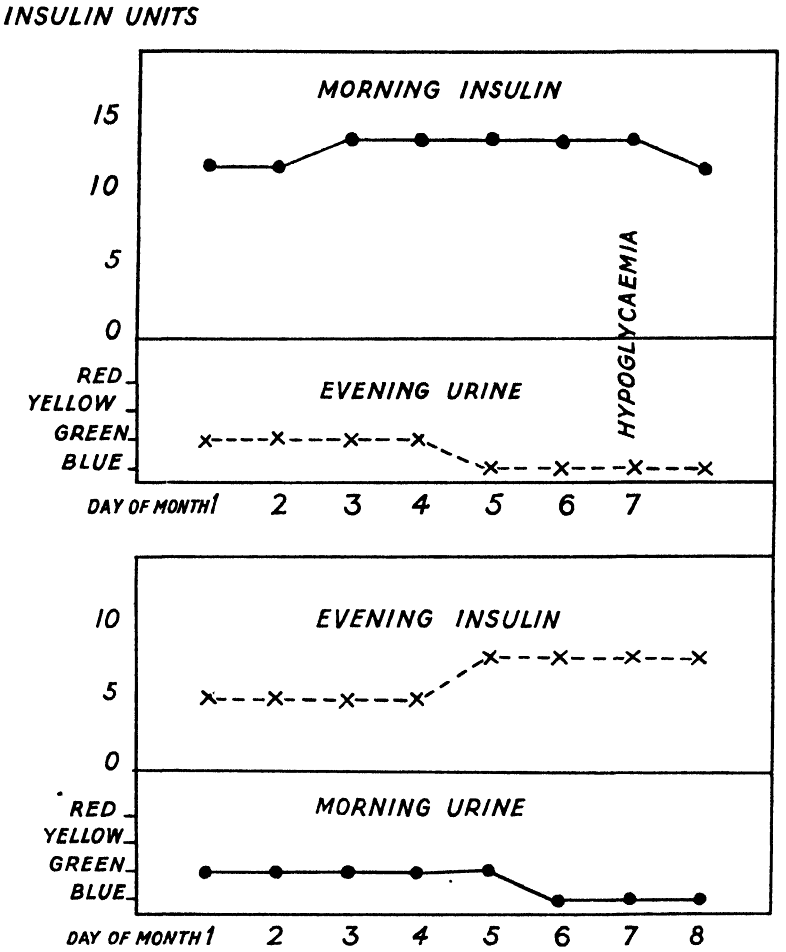

Fig. 3.—Shows the way of charting the dose of insulin and the sugar in the urine.

The chart also enables him to understand which dose of insulin he should reduce if he suffers from hypoglycæmia.

The foregoing method of urine testing is only of value when the threshold of the kidney is set at the usual level of 180 mgm. per 100 c.cm. If this is at a higher level, glycosuria will not occur, although the blood sugar is too high. If, on the other hand, it is set at a lower level glycosuria will occur, although the blood sugar is below 180 mgm. per 100 c.cm. or even lower. These variations in the threshold make it essential to estimate the blood sugar during the beginning of treatment in order to determine whether or not this method of urine testing is of any value.

THE DIET

Great changes have been made in the diet in recent years, and most of them are improvements from the point of view of the patient. The diet used to be deficient in caloric value, and in carbohydrate; usually it contained an excess of fat, and a reasonable amount of protein. During the last six to seven years the carbohydrate has been increased from about 50 gm. to 150 or 300 gm. in the day; the fat has been decreased from the 250 or 150 gm. which was customary to 100 gm. or even 50 gm.; and the caloric value has been increased, or has been kept the same. There is at present no general agreement regarding any of these three points, and it is very difficult to be certain which is the best treatment because most of the patients feel so well. I believe that the carbohydrate should be increased to at least 100 gm., and that if the patient cannot maintain a normal blood sugar on this diet he should be given insulin. A great many adults feel satisfied with 130 to 150 gm., but those who are doing heavy work or taking much exercise, as well as growing children, may need between 150 to 200 gm. or even more. Patients undoubtedly feel better with these diets, and also have more energy, and it is usually easier to keep the blood sugar within normal limits than with the low carbohydrate diets. Most physicians reduce the amount of fat when the carbohydrate is increased, and the caloric value usually remains about the same. Some, like Geyelin and Rabinowitch, believe that the fat should be reduced to a small amount, e.g. 50 gm., and the carbohydrate increased to 250 gm. or more. This great increase in the latter has the advantage that carbohydrate-containing foods need not be weighed, but only measured by the eye or compared with models. The decrease in the fat is achieved by avoiding all fatty foods, such as bacon, eggs, butter and cream, and eating fish or meat which contain little fat. It is claimed that these patients usually have a normal blood-sugar. This diet seems unbalanced, and the content of vitamin D must be low. Many patients would feel it almost as irksome as the old diets, since it contains no bacon or eggs, and very little butter. It is also said that these patients usually have definite glycosuria. Another scheme is to increase the carbohydrate and keep the fat at a high level, e.g. 150 gm. or more. This means a considerable increase in caloric value, even approaching the normal. I believe that patients do well with a diet which is between the extremes, say 150 gm. of carbohydrate, 70 to 80 gm. of protein, and 100 gm. of fat. Such a diet requires more care in weighing the carbohydrate-containing foods than the very high carbohydrate diets, but is much more palatable than the low-fat diets.

If an increase is made in the carbohydrate ration it should be balanced by more insulin in the proportion of 1 unit to 4 gm. of carbohydrate. If two doses of insulin are given the food should be divided into three main meals of approximately equal size, breakfast, lunch and dinner. The tea meal should be as small as possible, because the effect of the breakfast insulin has almost passed away by that time. A few patients, however, are so unhappy without a good tea that it is better to allow them 20 or 30 gm. of carbohydrate at this meal and to give a third dose of insulin in the proportion of 1 unit of insulin to 4 gm. of carbohydrate immediately before tea time. The blood sugar may usually be kept within normal limits with two doses of insulin, but such is not always possible, as some patients have hyperglycæmia before and immediately after the dose of insulin and suffer from hypoglycæmia three to five hours after the dose of insulin. This condition can sometimes be corrected by giving a third dose of insulin immediately before the mid-day meal. The morning dose of insulin should be reduced by 5 to 10 units in order to prevent any hypoglycæmia at mid-day, and the third dose of 5 to 10 units administered immediately before lunch. The latter should be sufficient to prevent any glycosuria occurring before the evening dose of insulin. If the patient suffers from hypoglycæmia at night the evening dose of insulin may have to be decreased. Many patients dislike having a third dose of insulin because of the inconvenience and also it renders them liable to an attack of hypoglycæmia in the afternoon, as well as the morning while taking exercise. For these reasons I rarely advise a third injection, and prefer to use " buffer " meals. In this method the breakfast carbohydrate is reduced by 10 to 15 gm., and the " buffer " meal of 10 to 15 gm. is eaten in the middle of the morning before the hypoglycæmia occurs. This has the advantage that it may prevent hyperglycæmia after breakfast, and also the mid-day hypoglycæmia. A similar " buffer " may be given at 10 or 11 p.m., before going to bed. The "buffer" meal sometimes prevents the hyperglycæmia which is apt to occur immediately before the next dose of insulin, and so keeps the blood sugar within normal limits all the day. The carbohydrate may be taken in any convenient form, such as biscuits, fruit or milk, while some patients prefer it in the form of sugar, i.e. a boiled sweet, as this causes less inconvenience.

One disadvantage of the high carbohydrate diet is the glycosuria which occurs when less exercise is taken during the day. A considerable amount of sugar is burnt up during exercise, and if this is not indulged in on a wet day the dose of insulin is inadequate to maintain a normal blood-sugar. In these circumstances the amount of carbohydrate at the mid-day and evening meals should be reduced by 10 to 20 gm. The patient should soon learn how much less carbohydrate he should eat.

A SAMPLE DIET

					Totals.			
	C.	P.	F.	Cals.	C.	P.	F.	Cals.
Breakfast								
1 Egg	—	6·4	5·7	80	—	—	—	—
1 oz. Bacon	—	5·1	15·0	160	—	—	—	—
2 oz. Bread	30·0	4·8	0·4	140	—	—	—	—
4½ oz. Apple	10·0	—	—	41	—	—	—	—
¼ oz. Marmalade or jam	5·0	—	—	24	—	—	—	—
					46·0	16·3	21·1	445
Lunch.								
3 oz. Lean meat	—	21·0	21·0	281	—	—	—	—
6 oz. Green vegetables	2·0	—	—	8	—	—	—	—
3 oz. Potatoes	15·0	—	—	61	—	—	—	—
½ oz. Cheese	—	4·5	5·5	70	—	—	—	—
1½ oz. Bread	22·5	3·6	0·4	105	—	—	—	—
5½ oz. Orange	10·0	—	—	41	—	—	—	—
					49·5	29·1	26·9	566
Tea.								
Cup of tea	—	—	—	—	—	—	—	—
½ oz. Dry biscuit	10·0	2·0	—	49	—	—	—	—
	—	—	—	—	10·0	2·0	—	49
Dinner.								
Gravy soup	—	—	—	—	—	—	—	—
2 oz. Lean meat	—	14·0	14·0	186	—	—	—	—
3 oz. Potatoes	15·0	—	—	61	—	—	—	—
6 oz. Green vegetables	2·0	—	—	8	—	—	—	—
½ oz. Cheese	—	4·5	5·5	70	—	—	—	—
1 oz. Bread	15·0	2·4	0·3	70	—	—	—	—
3 oz. Plums	7·5	—	—	30	—	—	—	—
					39·5	20·9	19·8	425
3½ oz. Milk in the day	—	—	—	—	5·0	3·7	3·5	80
1 oz. Butter in the day	—	—	—	—	—	—	25·0	246
					150·0	72·0	96·3	1811

THE TREATMENT OF INFECTIONS

If the patient develops another disease it is very important to increase the insulin promptly, and so control the glycosuria. If this is not done, coma may develop when the infection is severe, or the diabetes may become much worse when the infection is mild. If the patient develops a cold, the insulin should be at once increased by 2 or 4 units, even though glycosuria is not present, and by 4 or 8 units if it is. If the infection is more severe it may be necessary to increase the dose by 20, 40 or even 100 units in the day. This task is made much easier if it is possible to estimate the blood sugar, but in any case it can be made simpler by using the urine chart already described (fig. 4).

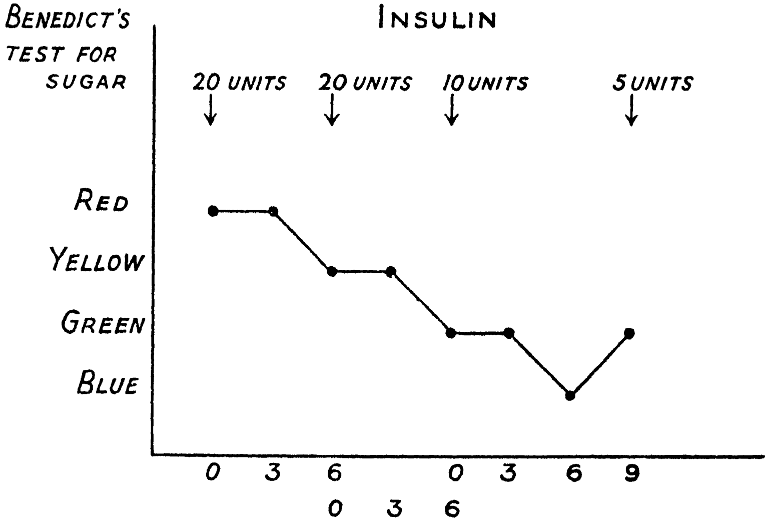

FIG. 4.—Shows the sugar in the urine and the dose of insulin which should be given during an infection.

A patient may be taken ill during the night, and in the morning may find that the urine contains much sugar, whereas usually it is sugar-free. He may also have been sick, or have no appetite for breakfast. Many patients are inclined to omit their insulin, and if they do so, they may become unconscious in the course of the next 24 to 48 hours. Insulin should always be administered, and the dose may be estimated by the following rules :—

If the urine contains no sugar, one-third of the usual dose should be given; if a little sugar is present, half the dose; if much sugar, the full dose. If the patient is well enough to take the usual amount of carbohydrate, the dose of insulin should be increased by 5 units if the test is green; 10 units if the test is yellow; and 15 units if the test is red. The size of the next injection should be decided either after an estimation of the blood sugar six hours later, if this is possible, or by the examination of the urine, which should be collected and tested every three hours. The urine in the first three hours after the insulin will contain sugar, and that four to six hours following the injection will also contain sugar, if the dose of insulin was not adequate. In this event, another dose of insulin should be given, the size of which may be determined by the following rules : if the Benedict test is green, half the first dose is indicated; if yellow, the same dose; if red, double the dose. The same procedure is followed every six hours until the urine in the four- to six-hour period is free from sugar. When this occurs insulin is contra-indicated until sugar again appears, and then only half the amount of the last dose. During the infection an effort should be made to give 100 to 150 gm. of carbohydrate in some form, e.g. milk, orange juice, bread or sugar. Most patients are willing to take orange or lemon juice sweetened with sugar.

EXERCISE

This is apt to cause attacks of hypoglycæmia. The following suggestions may prevent it :—

(1) If the exercise is taken in the morning, the dose of insulin should be reduced by 5 or 10 units, and an extra 10 gm. of carbohydrate should be eaten at 11 or 11.30 a.m. in order to compensate for the glycogen used up in the course of the exercise.

(2) If the exercise is taken in the afternoon, hypoglycæmia is unlikely to occur, but an additional 10 to 15 gm. of carbohydrate should be eaten at tea time, so as to prevent hypoglycæmia occurring during the night.

(3) If the exercise is taken between tea and dinner, hypoglycæmia will not develop, but if the usual dose of insulin is given before dinner it may do so during the night. It is advisable to reduce the dose of insulin by 5 or 10 units, and increase the carbohydrate taken at dinner or at bed time by 5 or 10 gm.

These principles should be explained to the patient, and he should discover how to vary the dose of insulin and carbohydrate, according to the severity of the exercise.

Bathing.—A hypoglycæmic attack, which only causes inconvenience on land, may be dangerous in the water. Swimming is a severe form of exercise, and uses up sugar, thus rendering a hypoglycæmic attack more probable. It is therefore inadvisable to bathe between 11.30 and 1 o'clock, because hypoglycæmia may occur during this time, and an extra dose of carbohydrate, 10 to 15 gm. should always be eaten a quarter of an hour before entering the water, in order to prevent any risk of hypoglycæmia.

Motoring.—The majority of patients recognize the symptoms of hypoglycæmia at once, and correct it with sugar. A few patients do not do so, and may lose consciousness, become ataxic, or develop a state which is undistinguishable from drunkenness, except that the breath does not smell of alcohol. Such persons ought never to drive a car and should not apply for a licence. Patients who recognize the symptoms may drive in safety, provided they take certain precautions. They should not, if possible, drive between 11.30 and 1 p.m., but if it is necessary they should take an extra 10 to 15 gm. of carbohydrate at 11.30 a.m. If they are not going to drive after lunch, this amount of carbohydrate should be deducted from the lunch, but if they propose to drive in the afternoon it should be an addition to the usual ration. They should, if possible, never continue to drive after the usual lunch hour, but if it is essential, they should stop for a few minutes and take 10 to 15 gm. extra carbohydrate at the hour for lunch. All these should invariably have with them sugar dissolved in water in a flask, for it acts more quickly in solution.

SOME RECENT ADVANCES IN GYNÆCOLOGY

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RECENT advances in gynæcology have resulted not so much from clinical observation and improved technique as from the application of new knowledge gained in the laboratory by animal workers and biochemists. As would be expected, the chief advances are along the line of sex physiology, especially as regards the hormones concerned in the processes of menstruation and reproduction.

THE OVARIAN HORMONES

It is now definitely proved that the ovary produces two hormones. The ripening ovarian follicle produces a hormone to which the name of *folliculin* or *œstrin* is given. When the follicle has ripened and produced the corpus luteum the latter generates another hormone known as *progestin* or *proluton.* Upon the duly maintained and sufficient action of these two hormones depend genital development, menstruation and reproduction. The growth of the uterus and the other secondary sex organs during childhood, and also the maintenance in a state of "vitality" of the entire genitalia of the sexually mature woman are the result of constant production of the follicular hormone (which begins to be secreted during early fœtal existence). Moreover, between puberty and the menopause, the extra amount of hormone secreted by the ripening Graafian follicle excites the "proliferative" phase of the endometrium during the first ten days or so of the intermenstrual interval. The hormone may thus be said to have two tasks to perform, one continuous and the other intermittent.

It is the duty of the corpus luteum hormone to complete the work of the follicular hormone, and to convert the endometrium from the "proliferative" phase into the "secretory" phase, which begins with rupture of the follicle and ends with the menstrual period (unless pregnancy occurs, when it continues to develop into the decidua of pregnancy). The purpose of this change is to prepare a perfect medium for the nidation of the ovum. Thus the corpus luteum hormone is the hormone which prepares the uterus for pregnancy. The relationship between these hormones and the events in the menstrual cycle should be noted.

Furthermore, it is now known that the periodic changes in the ovaries (and hence in the uterus) are dependent upon the secretion of the pars anterior of the pituitary gland, known as the *gonadotropic hormone* or *prolan*. Prolan passes into the blood-stream from the pituitary gland and stimulates the follicles to ripen and rupture and form the corpus luteum. The presence of prolan in the urine in pregnancy was first noted by Aschheim and Zondek, and upon this discovery is based their well-known pregnancy test. This test is of immense value in clinical work, and has revolutionized the diagnosis of early pregnancy.

The follicular hormone.—Although œstrin has been known, and has been prepared commercially, for many years, its therapeutic administration has until recently been quite ineffective for the simple reason that the dosage was absurdly inadequate. Œstrin is measured in mouse units, i.e., one mouse-unit will produce in a mouse the sign of œstrus as indicated by the vaginal smear test; but 300 units must be administered to produce the full manifestations of complete œstrus. It soon became apparent that the amount necessary in various animals bore a relationship to the body-weight and that at least 2,500,000 mouse units (or 500,000

" international " units, one international unit being equal to five mouse units) would be necessary to produce physiological or therapeutic effects in the human female. As soon as this all important fact became realized, therapeutic success was attained.

In the normal woman about 100 mouse units of œstrin are found in each litre of urine, but during the later months of pregnancy this amount rises to about 10,000 units. The urine of mares in late pregnancy contains more than 100,000 units per litre, and this is the chief source for the commercial preparation of the hormone. This abundant supply of œstrin has made its isolation and commercial preparation easy, and there is no difficulty nowadays in obtaining for clinical use as much as may be desired. It has not yet been possible to manufacture œstrin synthetically although its chemical formula is all but known.

Œstrin is obtained from the urine in crystalline form of remarkable potency, being equal to about 10,000,000 international units per gramme of crystals. Partial hydrogenation of the substance produces the compound known as *dihydrofolliculin*, and increases the potency fourfold. This is the form in which œstrin is nowadays usually prepared. It is marketed in tablet and ampoule form. Trade names are many, but the chief one is " progynon." The ampoules of progynon are prepared in strengths varying from 50,000 to 500,000 international units.

Progestin.—The action of progestin in converting the endometrium from the proliferative into the secretory phase has already been mentioned. The secretory phase lasts fourteen days and then either ends in destruction by the occurrence of a menstrual period, or, in the event of pregnancy, continues its development to form the decidua.

Progestin has other functions of interest in therapeutics. In one sense it is antagonistic to folliculin, for it inhibits follicular ripening and ovulation. Moreover, progestin takes care of the early implanted ovum by inhibiting contractions of the uterine musculature which might result in abortion. Many cases of abortion, and of repeated abortion are now believed to be due to under-secretion by the corpus luteum. Progestin does not act when given by the mouth, and is dispensed in ampoules for intramuscular injection. Its strength is carefully standardized according to " clinical units " (one clinical unit equals one-third of a rabbit unit), varying in strength from 2 to 20 clinical units. Its presence in the ovaries of animals is sparse, and its isolation is tedious. Hence its price is necessarily high—so high, indeed, that its use is almost prohibitive in most cases. During the past year, however, the hormone has been isolated in pure form and its constitution established, and no doubt its synthetic manufacture will permit of a reduction in price. It has various trade names, one of which is " proluton."

The therapeutic dose.—The foundations of success of ovarian therapy were laid by the work of Kaufmann. He set himself the problem of finding out what was the dose of œstrin necessary to produce the desired physiological effect in the human female. Up till then the amount usually given had varied from a few hundred to a few thousand international units of œstrin daily, and this dose seldom had any effect at all. Kaufmann was enabled in an ovariectomized woman to transform the atrophied endometrium into the functionally active secretory or premenstrual phase of the menstrual cycle, and to bring about the destruction and discharge of the latter accompanied by a flow of blood—in other words, he succeeded in reproducing the whole menstrual cycle. But he had to use very large doses and both hormones, progynon for the proliferative and proluton for the secretory phase.

It is important to note his method and dosage for it forms the basis of modern ovarian therapy. On the first, fourth, eighth, eleventh and fifteenth days of the period of treatment he gave intramuscular injections each of 250,000 international units of progynon. These were followed on the nineteenth, twentieth, twenty-first, twenty-second and twenty-third days by injections each of 20 clinical units of proluton. Menstruation occurred on the twenty-fifth day and lasted for three days. It was proved to be true menstruation by the discovery in the discharge of fragments of endometrium in the secretory phase.

If we take 1,250,000 international units of progynon as the minimal dose necessary to produce the physiological effect of converting a resting or atrophied endometrium into the proliferative phase, and 100 clinical units of proluton as the minimal dose to carry over the proliferative phase into the secretory phase, we shall have a sound basis for therapeutic dosage in cases of ovarian dysfunction.

CASES SUITABLE FOR TREATMENT BY THE OVARIAN HORMONES

These are as follows: (1) primary amenorrhœa; (2) secondary amenorrhœa; (3) oligomenorrhœa; (4) climacteric disturbances; (5) uterine hæmorrhage of endocrine origin.

Primary amenorrhœa.—It is customary to divide these cases into two groups: those in which there is under-development of the uterus (the infantile and pubescent types of uterus) and those in which the uterus is well grown. In the first group the prime object of treatment is to promote growth of the uterus, and this has a fair chance of being achieved in young patients. The dosage must be large and the treatment prolonged, at least 1,000,000 international units of progynon a month being given for three or more months. Treatment according to Kaufmann's scheme (progynon followed by proluton), should be tried in these cases. Growth of the uterus and menstruation have been produced in a small proportion of cases, but so far few, if any, cases of spontaneous menstruation occurring after cessation of treatment have been reported. In cases of primary amenorrhœa with well-developed uterus adequate doses and persistence may be expected always to produce true menstruation, but very few cases have been reported in which spontaneous menstruation has been established. The Kaufmann scheme should be used if progynon alone proves ineffective.

Secondary amenorrhœa.—In some of these cases menstruation has been regular for a number of years before it ceased; in others, menstruation has been irregular and scanty from the first. In some cases the uterus is well developed, in others it is undergrown. Naturally enough all cases must be subjected to a rigorous investigation to exclude the presence of any general disease capable of causing secondary ovarian deficiency. In cases due to primary ovarian deficiency, adequate treatment with progynon with or without the subsequent administration of progestin, will almost invariably succeed in provoking the onset of menstruation. And in cases in which there is good uterine development, spontaneous menstruation may be expected to continue regularly after the cessation of treatment. The same remarks apply to cases of oligomenorrhœa. As would be expected, secondary amenorrhœa is much more amenable to ovarian therapy than primary amenorrhœa.

Cases with general symptoms of ovarian deficiency comprise chiefly cases of natural or artificial menopause —the latter including cases of surgical removal of the ovaries for ovarian tumours and cases of destruction of the follicles by radium or X-ray therapy for various reasons. The well-known symptoms are flushes and sweats, insomnia, depression, and sometimes vulval pruritus. It is in this type of case that the results of treatment by follicular hormone are most striking. All symptoms—other than those which are of psychogenic origin—can be relieved almost with certainty. The disappearance of troublesome and persistent flushes and sweats is dramatic. There is no need to use the corpus luteum hormone. Dosage should be generous to begin with—say 500,000 international units a week for a few weeks, followed by a gradual reduction and suspension of the treatment after three months. A gradual reduction of dosage is important.

Uterine hæmorrhage of hormonal origin.—It is now generally believed that nearly all cases of the menorrhagia (so called) of puberty and the climacteric are due to derangements in the physiological hormone production of the ovaries. The underlying basis of the condition is the so-called cystic hypoplasia of the endometrium, the endometrium being thickened and the glands dilated. This abnormal thickening is ascribed to an excessive production of follicular hormone. Moreover, large persistent follicles are found in the ovaries and there is no trace of a corpus luteum. In fact, the ovaries remain in a persistent follicular phase and the endometrium, in consequence, in a persistent and exaggerated proliferative phase.

What inhibits follicular rupture in these cases is not known. Kaufmann has actually produced cystic hypoplasia of the endometrium in an ovariectomized woman by giving her five times the physiological proliferation dose of progynon (i.e. 5,000,000 international units).

The therapeutic indication in these cases is to give the corpus luteum hormone to convert the overproliferated endometrium into the secretory phase and bring about its shedding by menstruation. To effect this large doses are required. It is found, however, that if a very large persistent follicle is present neither large nor small doses will stop the bleeding.

THE DAY OF OVULATION IN THE OVARIAN CYCLE

It is important to know the point in the menstrual cycle at which ovulation occurs; for intercourse at or about that point is likely to be fruitful, and *per contra* by shunning that point intercourse is likely to be unfruitful. The practical application to the opposite problems of infertility and contraception, respectively, is obvious. Accurate knowledge on this point would be of great value to innumerable people. For a good many years now, as the result of histological examination of uteri and ovaries removed by operation at known dates in the menstrual cycle, it has been possible to state that ovulation occurs at some time between the tenth and nineteenth days of the 28-day cycle. But these limits are too wide for practical purposes. Besides, the difficulty of getting reliable data from women about the dates of their menstrual cycles has always been a handicap to accurate work; few women record their cycles in a calendar, as they should do.

During the last year certain work has been done (by Knaus in Austria, and Ogino in Japan) which shows that the time of ovulation can now be fixed much more accurately. Without going into details, Knaus's own special observations (apart from clinical studies) on the precise time of ovulation are concerned with the refractoriness of uterine muscle to pituitrin when it is under the influence of the luteal hormone. Both Knaus and Ogino (whose work was based almost entirely on the examination of large numbers of operation specimens of uteri and ovaries, as well as on clinical data) came to the same fundamentally important conclusion: that the interval between ovulation and the onset of the following menstruation is a constant one. In women with normal reproductive physiology ovulation occurs regularly and spontaneously on the fifteenth day before menstruation. This " law " holds good for all types of cycle. Moreover, Knaus believes that conception can occur *only* for a few days in the cycle and he bases this view on two assumptions: (1) the fertility of the shed ovum is extremely short-lived and cannot be regarded as lasting longer than the day of ovulation; (2) the spermatozoa lose their fertility after ejaculation into the vagina in about 48 hours, this being due to a temperature change (the vagino-uterine temperature being fractionally higher than the scrotal) and the chemical conditions (acidity) which they encounter in the vagina. The sum of these two time-factors gives at most a period of three days during which a woman is capable of conceiving: the day of ovulation itself and the two days immediately preceding it.

Practical application for the purposes of helping or hindering conception.—The first essential is to find out the length of the cycle. If a woman has made it her practice to enter the day of onset of menstruation on a calendar (as all women should, but few do), this is easily obtained. But, if not, she is instructed to do this for six months or more. The lengths of the cycles are then seen. Few women are perfectly regular, most varying between 27 and 29 days. It is remarkable what a high incidence of gross irregularity there is even in women who aver they menstruate regularly "every four weeks" or "every 28 days." If the cycle is found to be a regular one the calculation of the day of ovulation is easy enough. Say the length of the cycle is 28 days; then the fifteenth day of the cycle before the onset of menstruation is got by counting forward 14 days from the first day of menstruation (the first day being counted " one "). In the commonly met irregular cycles the calculation is almost as simple. " The ovulation date is that period of time which falls between the two ovulation days of the shortest and longest cycles, respectively, the cycles being recorded for at least twelve months " (Knaus). For example, suppose the cycles in a given case to vary from 26 to 32 days inclusive. The ovulation day for the shortest cycle is found by counting 12 days forward from the first day of menstruation and that of the longest is found by counting 18 days. The possible dates of ovulation for any future cycle then lie between these two extremes, the spread being seven days, on any one of which ovulation may occur.

In practice, in advising a woman concerning the days in the cycle in which she is unlikely or likely to conceive, it is wise to lengthen the conception period, as determined by the length of the cycle, by a day at the beginning and a day at the end. In a woman with a completely regular cycle the calculated period during which conception can take place is therefore one of five days : the day of ovulation, three days before it and one day after it. The general rule for determining the fertile period can be formulated as follows : " The period during which conception can take place consists of the ovulation period *plus* three days before and one day after it " (Knaus).

In cases of infertile marriage the couple are advised that conception is much more likely to occur if intercourse is restricted to the fertile period. This advice is especially of use in cases of weak male potency, or when the sperm content of the semen is below the average.

IMPROVEMENTS IN THE TREATMENT OF STERILITY

The treatment of " female sterility " was in the past extremely crude. Scarcely any investigation was made beyond a vaginal examination, and the standard treatment was dilatation of the cervix, with or without curetting. Very little notice was taken of the husband, beyond enquiring whether or not he was potent. That this has all changed, and that the subject of human sterility has been placed on a scientific basis is owing chiefly to the American gynæcologists, among whom S. R. Meaker may be specially mentioned.

Both the partners are nowadays subjected to a series of tests to ascertain the presence or absence of a number of what may be called "infertility factors." Seminal examinations—which deal not only with the volume of the ejaculate and the number of spermatozoa per c.cm., but also with the shapes and deformities of the spermatozoa, are always made, and in some cases repeated, to ascertain the degree of male fecundity. It is a rule that the wife be submitted to no treatment until her husband is proved fecund. In cases of defective spermatogenesis such remediable states as exist are remedied (e.g. septic foci, hypothyroidism, hypopituitrism, defective diet, alcoholism). As regards the wife, the majority of infertile women reveal, if they reveal anything at all, one or more of a fairly consistent group of what may be called "infertility factors," the chief of which are genital hypoplasia, defective ovarian activity, anterior pituitary deficiency, hypothyroidism, defective diet, infections and injuries of the cervix, sealed Fallopian tubes, retroflexion of the uterus.

Investigation for the infertility factors is made by the appropriate tests. Bimanual pelvic examination, measurement of the uterine cavity (including the relative lengths of body and cervix), testing the Fallopian tubes by intrauterine injections of air and lipiodol, the basal metabolic rate for thyroid defect, and alterations in the sugar tolerance test for defective action of the anterior lobe of the pituitary gland are indispensable in a great many cases. The degree of acidity of the vaginal and cervical secretions is now beginning to receive attention; for it is known that spermatozoa very rapidly become inactive in an acid medium (as in the normal vagina), but show unabated activity in an alkaline medium (as in the normal cervical canal).

All these investigations are simple to carry out, none is harmful, and none need be costly. In a short review it is impossible to go into details, but the following points may be particularly noted :—

Investigation of the Fallopian tubes.—The intrauterine injection of lipiodol (an oil containing 10 per cent. of iodine and opaque to X-rays) has so many advantages over that of air or gas that many gynæcologists have abandoned the latter for the purpose of diagnosis. The lipiodol test gives information on two points: (1) If the tubes are open or closed; (2) if closed, the site of the obstruction. The second point is of great importance, because, if the obstruction is situated in the uterine end of the tube or, indeed, anywhere except at the fimbriated end, operative treatment is so unlikely to succeed that it is hardly worth while considering; whereas if the obstruction is found to be at the fimbriated end, the lumen can almost certainly be restored by a simple operation. Moreover, it is generally conceded that the information given by the lipiodol test is more reliable as regards the presence or absence of an obstruction. Both the gas and the lipiodol methods are therapeutic as well as diagnostic. At all events, pregnancies have followed both with sufficient frequency to support this belief. It is believed there is such a thing as a " sticky " tube, the lining mucous membrane becoming " sticky " and the walls stuck together. The forcing of gas or oil along such a tube would certainly tend to open it. It is generally conceded that blocked tubes are a relatively rare cause of infertility, occurring in only about 4 per cent. of cases as revealed by the lipiodol test. As regards the results of operation on blocked tubes, they are disappointing, and most gynæcologists have rather reluctantly come to the conclusion that the number of successes is very meagre compared with all the time and trouble spent on investigation and operative treatment.

TREATMENT OF STERILITY DUE TO FOLLICULAR HORMONE DEFICIENCY.

Cases of ovarian defect (i.e. defective growth or defective function) usually show some form of menstrual abnormality of greater or less severity, such as primary or secondary amenorrhœa, scanty or painful menstruation. The defect may be primary, or may be secondary to anterior pituitary disturbance at or near the time of puberty. Defective ovarian activity is usually associated with an ascertainable degree of uterine hypoplasia. Quite apart from this type of case it is believed that in women with anatomically normal ovaries menstruation may sometimes occur without ovulation ("anovular menstruation"). In practice it is impossible, nor is it of practical importance, to distinguish between primary and secondary ovarian cases. It will be readily appreciated that, whereas in the male a direct and easy test of fecundity (i.e. of spermatogenesis) is afforded by examination of the semen, there exists at present no means of ascertaining the occurrence of ovulation. A certain amount of indirect evidence is afforded by the presence of abnormalities of menstruation. In practice, in the treatment of cases of infertile marriage, if other treatment fails to relieve, the case may be assumed to be one of defective follicular hormone activity and treated accordingly by substitution therapy. This is not scientific, but is the best that can be done at present, and the method is sometimes justified by the result. The desired therapeutic effect from the administration of the hormone in these cases is an extra stimulus to the follicles to ripen and rupture.

RECENT ADVANCES IN TREATMENT OF DISEASES OF CHILDREN, INCLUDING IMMUNIZATION METHODS

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A SURVEY of advances in the treatment of diseases of children in recent years shows clearly two distinct tendencies. On the one hand preventive measures are being urged and used for an increasing number of maladies and on the other hand the results of laboratory work, biochemical in particular, have secured a ready application in the efficient treatment of certain special disorders of which some examples will be described below. The fall in the infantile mortality rate in the present century is in some measure due to these two tendencies. It is a matter of some concern, however, that in the early weeks of life the same improvement cannot be recorded. Numerous observers, in different parts of the world, have called attention to this persistently high neonatal mortality rate and it seems agreed that details of management in the new-born period need overhauling in certain respects. Some of these will be briefly discussed.

MANAGEMENT OF THE NEWLY BORN

In the October Special Number of last year Ellis[1] drew attention to the extreme importance of gentleness in the handling of the new-born and to the value of carbon-dioxide inhalation in the treatment of respiratory difficulties. Other workers[2] have since testified to the dangers of vigorous methods of artificial respiration and Blaikley and Gibberd[3] also emphasize the futility of the older methods. Lest practitioners should rely too much upon the extremely handy containers of carbon dioxide now available it seems worth while emphasizing that for most new-born babies adequate cleaning of the pharynx of all mucus, aided by some form of catheter with a well-protected end is all that is necessary. For those who do not respond to such measures the method of tracheal intubation described by Blaikley and Gibberd is of great value. The indications for this procedure are chiefly for those instances where premature inspiration has caused inhalation of liquor amnii. Only by intubation can the air passages be properly aspirated and it is especially in such babies that some degree of controlled, positive-pressure inhalation is important to secure full expansion of the lungs. The apparatus described for these manipulations is compact and can be easily carried in the midwifery bag.[4]

For the *premature baby* certain points of importance in management have been stressed by modern workers. That nursing and environment are of very great importance needs little emphasis. In America the use of special rooms where the air is " conditioned " has proved with scientific accuracy that the humidity of the air breathed by premature infants is of great importance. Blackfan and his associates[5] recommend 65 per cent. humidity with a temperature of about 75° C. as producing the best results in small babies. Although special rooms where such an " atmosphere " can be expensively maintained are not practical save in large centres, the lessons learned can be applied in a modest way in any house with the help of a " wet and dry " bulb thermometer. With a dry-bulb reading of about 70–75° F. the wet bulb should be at about 65° F. to give the optimum degree of humidity. More simple still is to employ a " damp detector " (such as is sold for keeping travellers out of damp beds !) and lay it near the baby's head: as long as it registers "damp" the air is probably moist enough. To secure this degree of moisture in the air care must be taken to place bowls of water near any source of heat or hang wet towels over radiators or before gas-fires. The temperature of the baby is best maintained whenever possible by the use of a small electric blanket. The Thermaga pattern, as employed for some years at Queen Charlotte's Hospital, London, has proved a great success.

ADVANCES IN TREATMENT

A large number of therapeutic measures have been advocated during the past year and it is impossible to indicate more than a few. Those chosen here have scientific work or careful clinical observations to warrant their inclusion and it has also been necessary to avoid repetition of what has been said in other contributions to this or recent issues of this journal.

Ascorbic acid in scurvy.—While orange juice and tomato juice still must be regarded as the best vehicles for administering vitamin C as a routine prophylaxis against scurvy for young infants there are circumstances in which the cure of this malady may be swiftly carried out by the synthetic vitamin product or in which the fruit juices cannot be tolerated. Svensgaard[6] early in 1934, reported the cure of infantile scurvy in two instances by means of ascorbic acid supplied by Szent-Györgyi. Bell[7] about a year later published what he claimed as "the first fully-reported case of the cure of a deficiency disease by the administration of a synthetic vitamin." In this instance he gave 50 mgm. of synthetic ascorbic acid (Hoffman-La Roche) by the mouth daily to a severe case of scurvy in a child aged 8 months. After four days this was reduced to 30 mgm. daily in view of the great improvement obtained. Goetsch[8] has advocated the use of a single massive dose of "cevitamic acid" intravenously and reports instances when 400 mgm. were used effectively. Sheldon[9] has pointed out the value of the synthetic vitamin in coeliac disease where fruit juice may not be tolerated. He found a 5 mgm. tablet of ascorbic acid daily was an effective prophylactic dose although on a diet completely devoid of vitamin C such a small dose for a young infant would probably be insufficient.

Erysipelas.—This may be a most serious malady in young children and infants so that recent claims for the beneficial effect of ultra-violet light warrant brief mention. It has been stated that this method of treatment will save four out of five cases of infants under one year in the absence of complications (Nightingale and Starr[10]). The method consists in the routine application of one-and-a-half erythema doses of ultra-violet radiation on three successive days, irrespective of the clinical course. The source of radiation should be set at ten inches from the area to be irradiated which should include the diseased portion of the skin and one to two inches beyond the spreading border.

Chorea.—It has wisely been said that the treatment of chorea is " six weeks " since the disorder does so often run this self-limited course. In consequence claims for any novel method of treatment must be carefully scrutinized. Nirvanol lost its temporary popularity when it was found that it did not prevent relapses nor appear to influence the occurrence of cardiac complications. Of recent times two new methods have been advocated. Bateman[11] from his experience with Lucy Sutton's pioneer work in New York introduced the pyrexial treatment for severe and prolonged cases. Fever is induced by a T.A.B. vaccine containing 1,000 million typhoid and 750 million each of paratyphoid A and B bacilli per c.cm. The vaccine is given intravenously, beginning with 0·05 or 0·1 c.cm.

and is continued each day, the dose being usually increased by about half, until the chorea ceases. Other workers have confirmed good results in certain cases, but there must be a careful attention to detail for which the original paper should be consulted. The other new method of treating chorea is the use of "calcium aspirin" advocated by Mutch.[12] Fully aware of most of the fallacies attending the drug treatment of this disorder Mutch puts forward a good case for this new remedy. He gives "calcium aspirin" (Coplans) dissolved in water by the mouth in an average dose of ten to fifteen grains, three times a day, and claims a decrease in the time necessary for the movements to become controlled.

Vulvo-vaginitis. — The unfortunate tendency of gonococcal vulvo-vaginitis in children to become chronic makes it clear that any prompt method of treatment must be of great value. It has been observed that œstrin produces changes in the epithelium of the vaginal mucous membrane in virgin mice and rats and this fact has been applied in the treatment of vulvo-vaginitis in children. Nabarro and Signy[13] have reported the successful use of œstrin in a series of children and recommend 1,000–2,000 units daily by injection or 4,000 units daily by mouth. Certain other cases with intractable non-gonococcal vulvo-vaginitis in which ordinary methods of treatment had failed to bring about a cure have also been successfully treated in this way. Regular douching in the early stages of the malady (in the gonococcal cases) with iodine (1 teaspoon of the tincture to the pint of water) once a day is also advocated.

Muscular dystrophy. — Modern research into the chemical aspects of neuro-muscular activity promises a wide field of useful results in therapeutics. The terribly crippling instances of pseudo-hypertrophic muscular dystrophy in children have hitherto presented no hope in treatment, but the use of "glycine" ("glycocoll" or better "amino-acetic acid") seems to have definite effects upon muscle metabolism and clinical improvement is also obtained. Although it is not possible to speak of "cure" it is hoped that further developments may introduce even more satisfactory methods. The dose advocated for children is 10 gm. daily given by mouth dissolved in milk.[14]

SPECIFIC PROPHYLAXIS OF INFECTIOUS FEVERS

The stage has now been reached when the scientific prevention of disease can be carried out with precision and certainty in a number of instances. It is likely that the practitioner of the future will be asked more and more to carry out certain prophylactic measures, and it is also likely that methods and material may be perfected. The following remarks are an attempt to summarize the present position which has been greatly clarified by the excellent report of the British Medical Association's committee on immunization.[15] The problems of immunity of the community as opposed to the protection of the individual will not be discussed here since it is assumed that the task facing the practitioner is what to do with an individual child. R. E. Smith's discussion of the problem as it occurs in a public school in the last issue of *The Practitioner*[16] has already covered some of the ground.

Smallpox and vaccination.—The scientific value of vaccination against smallpox is proved up to the hilt, and the present unsatisfactory position of an unvaccinated community is undoubtedly due partly to the absence of severe smallpox from this country and partly to an understandable prejudice against compulsion as applied to infants. The problem is complicated by the risk of encephalitis as a sequel to vaccination, and despite the absence of much chance of exposure to smallpox infection in this country at the moment there are two points to be considered in reference to the baby's future. First, it is impossible to foretell whether or not a baby may at some future date have to be vaccinated because of travel abroad, entrance to some public service or because of an outbreak of smallpox. Secondly, such an outbreak of smallpox of a more severe type is rendered more likely year by year by the increasing popularity of air travel. While a steamship returning from the East can discharge smallpox patients at Marseilles and all contacts can be vaccinated, it is possible for a traveller incubating the disease to board an air-liner in India and develop his rash in a London hotel. It is agreed that the risk of encephalitis is greatest for primary vaccination after the age of infancy: indeed, the number of instances of this complication among infants under six months of age is very small and can be frankly dismissed. Encephalitis after re-vaccination is also almost unknown. Hence it seems logical to urge upon parents that their babies should be vaccinated not because of the risks of smallpox but as a protection against the risks of encephalitis should vaccination become necessary (for the reasons already stated) in later life. Moreover, the prejudice against infantile vaccination would be greatly diminished if the practice of carrying this out in the early days of life were abolished and three months taken as the optimum age —well away from the neonatal period and before the upsets of dentition. Incidentally, it may be remarked that the practice of the authorities at certain convalescent homes in insisting upon vaccination before admission of patients should be strongly condemned in view of the Ministry of Health's recommendations. Further, it is illogical to insist upon such protection against a non-existent risk (at the moment) and ignore measures such as immunization against diphtheria which constitutes a much more acute problem.

Diphtheria.—Protection against this disorder may be passive or active. As a prophylactic for children who have been exposed to infection passive immunity may be secured by a single injection of 1,000 units of ordinary antitoxin. The immunity thus produced lasts about three weeks. Active immunity results from the injection of modified toxin mixtures. There is some difference of opinion as to the best preparation to be used, but for practical purposes the choice at the moment for a child is "T.A.F." (toxoid-antitoxin floccules). In theory only children giving a positive Schick test need be immunized, but in practice such a high proportion of children under eight years are non-immune that this preliminary test may be dispensed with. Probably the ideal time for immunization is in the second or third year of life. It is uncertain how long immunity lasts, but it is probably life-long.

The Schick test is performed with a short bevelled intradermal needle and glass syringe. *Into* the skin of the forearm 0·2 c.cm. of toxin is injected and a small wheal should be raised which quickly disappears. Into the skin of the other arm the same amount of heated toxin is injected as a control. The arms should be examined about the fourth day. Susceptibility to diphtheria is indicated if there is a reaction on the arm receiving toxin in a round circumscribed area (½ to ¾ inch in diameter) with slight infiltration. There should be no reaction in the control arm. If there is a reaction in the control arm it should be carefully compared in size, duration, and degree of infiltration with the other arm. If the two reactions are exactly similar the patient is immune. If the test arm gives a larger reaction of longer duration the patient is susceptible. If neither arm reacts the patient is Schick negative and immune.

Immunization with "T.A.F." is carried out by giving Schick-positive cases (or all children under eight without preliminary Schick testing) three injections of 1 c.cm. of the toxin-antitoxin mixture at two- to three-weekly intervals. These are best given intramuscularly. Severe reactions are rare in childhood but in older children, or if the control arm in the Schick test has shown any reaction, a preliminary dose of 0·1 c.cm. may be desirable and great care taken with subsequent dosage. Immunity should develop in six to eight weeks—great care being taken that the child is not exposed to diphtheria during this period. The Schick test should be repeated after this time and if positive, as it sometimes is further doses of T.A.F. should be given until a negative result is obtained.

Scarlet fever.—Passive immunity in the case of a child exposed to infection can be secured by giving anti-scarlatinal serum in doses of 2·5 to 10 c.cm., roughly 1 c.cm. for each year of life. It is desirable in an epidemic in a ward, for example, to carry out the Dick test, using standard scarlatinal toxin and heated toxin as control, performed exactly as for the Schick test. Readings are made earlier—best between 12 and 24 hours, and the result is usually a frank positive or negative. All positive reactors should receive a prophylactic dose of serum.

Active immunization against scarlet fever is not yet advocated on a wide scale, since the degree of immunity produced is not of long duration, and repeated injections are necessary. Beginning with about 500 " skin-test doses " for the first injection subcutaneously, the course is continued at weekly or fortnightly intervals giving 1,000, 5,000, 10,000 and 20,000 " skin-test doses." Dick testing must be carried out during the course and afterwards, and the doses varied in size and number according to the effects upon the skin test.

Measles.—There is no known method of artificially producing active immunity against measles. Passive immunity can be produced by the use of blood or serum from convalescent patients or from adults. It is not desirable in the ordinary way to seek to protect a child completely against measles unless (*a*) it is under three when the risk of serious complications is higher, or (*b*) when some other disease or debilitating condition is present which makes complete protection desirable. It is best, apart from these instances, to try for a modified mild attack. Serum is more potent than whole blood, and convalescent serum obtained from healthy adults about 10 to 14 days after the temperature and other symptoms have subsided is better than pooled adult blood or serum.

The *dose* of convalescent serum is usually 5 c.cm. as a minimum for young children, and after two years approximately 2 c.cm. for each year of age with a maximum of 10 c.cm. If pooled adult serum is used the dose should be doubled. If whole blood is used (and this is less reliable) the doses should be approximately twice as much as for the corresponding convalescent or adult serum. Thus the dose of pooled adult blood will be four times that of convalescent serum. The blood serum is given intramuscularly, and being of human origin there is no risk of any reaction. The *time* at which the serum or blood is given determines roughly the degree of immunity produced. Given in the first five days after exposure to infection convalescent serum in the dose as stated will produce complete immunity in over 95 per cent. of cases. Given on the sixth to tenth day after exposure the same dose of serum will produce an attenuated attack, less mild the later the dose is given. Results with adult serum and whole blood, convalescent or adult, are less reliable. The attenuated attack of measles generally begins at the expected time after exposure to infection but prodromal catarrhal symptoms are mild or absent, there is only slight fever for one to two days, a slight cough and a discrete rash resembling rubella. Permanent immunity follows an attenuated attack of measles. There is no point in giving blood or serum after the tenth day following exposure to infection. When complete protection is secured this lasts for two to three weeks.

It may be mentioned that convalescent serum has also been used to protect against, or secure modified attacks of, chicken pox and mumps, but the dosage and time of giving the serum are still at an experimental stage.

Whooping cough.—There is still considerable difference of opinion about the best vaccine to use for protection against whooping cough, and there are several bacteriological problems yet to be settled. As a safe working rule, since the modern vaccine is of low toxicity, it is best to give doses corresponding to 2,000 million Bordet-Gengou organisms every second or third day for three doses beginning as soon after exposure as possible. If pertussis occurs despite this it is certain to be in a mild or considerably modified form.

Quite recently Paterson and others[17] have described a new method of immunization against whooping cough controlled by a skin test. They suggest that a positive skin reaction to the intradermal injection of Sauer's pertussis vaccine means immunity to the disease. To the children giving a negative skin test they administer six doses of Sauer's vaccine. This is made from fresh, strongly hæmolytic strains of the Bordet-Gengou bacillus and is prepared with 10,000 million organisms per c.cm. The vaccine is given in bi-weekly injections, intramuscularly, of 1·5 c.cm. except for the first dose which is 1 c.cm. Skin tests are said to become positive about one week after completion of the course. This is a considerably larger dose than that advocated above for children known to have been recently exposed to whooping-cough infection.

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RECENT ADVANCES IN TREATMENT OF DISEASES OF THE SKIN

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WHEN dermatoses ceased to be the expression of an evil humour dermatology gained much in classification and in the understanding of local treatment, but the advance led to an exaggerated accumulation of descriptive titles posing as separate disease entities mostly of unknown etiology. A result of this was the divorce of dermatology from general medicine and its very limited participation in the extraordinary advances made in that sphere in the past fifty years. The past decade or two have seen a tendency towards the closing of this breach, and dermatology returning to the fold is being interpreted along general medical lines. This has necessarily led to advances in treatment which are the more important and considerable since they bear upon a great number of the most distressing of the skin diseases. Pruritus and eczema, seborrhœic dermatoses, lichen planus and even psoriasis are seen to be not simple skin diseases, but often the expression of some toxic, infective, metabolic or psychological disturbance affecting the organism as a whole and demanding general treatment. Most of the progress in the treatment of anæmias, of psychological and metabolic diseases, is directly applicable to skin medicine. This is not the place to enlarge upon this vital aspect of dermatology, but it may be stressed that the presence of a skin affection should not divert the physician from the general health of his patient, but should particularly direct his attention to this, since skin diseases are often early and obvious manifestations of internal disease. O'Donovan has written brilliantly upon the psychological aspects of dermatological medicine, but the great importance of this is still only partially appreciated. It is as natural as it is certain that so emotionally and nervously sensitive an organ as the skin is most ready to reflect disturbances in the mental barometer, and this is particularly seen in pruritus, urticaria and eczema. In chronic examples of these disorders psycho-neurotic causes must constantly be considered and must often direct the basis of treatment. Neglect of this aspect is one reason for the abundance of quack practice in skin diseases.

Barber has written widely upon the importance of the metabolic factor in dermatology, and there can be no doubt of the value of dietetic treatment in a wide range of diseases. Particularly important is the restriction of starchy, sweet and fatty foods in the seborrhœic and catarrhal dermatoses where an adequate intake of protein and fresh foodstuffs is necessary. In cases of eczema and lichen simplex associated with the gouty diathesis—obesity, hypertension and general instability in late middle life—a cure is often obtainable only when dietetic restrictions effective in the control of these other metabolic disturbances are instituted.

GOLD THERAPY

Dermatology, however, does not always await the progress of general medicine, and the use of gold salts in the treatment of some chronic toxic dermatoses has long been established. The treatment of lupus erythematosus is so remarkably successful that reference must be made to it though the condition is not very common in general practice. Since quite small doses of gold are sufficient in the majority of cases the procedure is a reasonably safe one. I prefer the intravenous route using krysolgan (Schering) in a course of twelve weekly injections, ranging from 0·0154 grain to 0·75 grain. This dosage is infinitely less than that used in the treatment of tuberculosis or rheumatoid arthritis. More than one course is occasionally necessary and a certain number of relapses are seen, but these usually respond to a repetition of the treatment. In my experience extraordinarily few cases fail to respond to this line of attack. It is only suitable for chronic and not for acute cases, and all must receive a proper investigation and any rational or symptomatic treatment indicated—such as removal of foci of infection or protection by quinine or tannic acid creams from actinic irritation—before an empirical therapy such as gold is employed. Should stomatitis or toxic rashes arise in the course of gold treatment the measure should be stopped, not repeated and glucose be given.

PYOGENIC DERMATOSES

Occasionally dermatology points the way for medicine or surgery, and the conservative treatment of skin sepsis is probably a case in point. There has always been a certain sense of righteousness about the surgical attack on skin sepsis. It has been so easy here to express a faith in the teaching " where there is pus let it out," and with the enthusiasm of crusaders to wield the surgical knife—stamping unholy crosses upon boils, carbuncles and abscesses. It is a little hard to abandon all the pleasure and satisfaction which these practices afforded, and that may be one reason why the old surgical teaching dies hard. But the time has come when the treatment of skin sepsis should be removed from the domain of surgery and given to the physician. Deep and crucial incisions, probings, scrapings, packings and squeezing of septic skin affections should be considered as criminal as the use of dirty instruments. Conservative treatment is justified in that it limits the disease, resultant injury and deformity, shortens its course and affords greater comfort for the patient, avoiding that trail of chronic ills which is too often the sequel of surgical interference.

In the case of follicular infections the use of occlusive dressings shows that it is actually beneficial to shut in the pus rather than let it out. A painful point of erythema round a hair follicle on the finger with or without a cap of pus resolves under a film of collodion when removal of the hair and incision will as often as not mean a septic finger. The indurated papule on the nape of the neck or the boil which is maturing is ripe or even discharging, should be covered by an elastic adhesive plaster dressing which should be left in place for as long as is thought necessary to allow the lesion to heal. It is only intelligent to swab surrounding skin and hands with a mild antiseptic lotion, but this is as much interference as should be allowed the fingers, which are the chief cause of spreading and persistence of skin infections. The elastoplast dressings may be used for impetigo, and while it is undoubtedly a better measure than mercurial ointments, it is not as good as mercury in a paste (hyd. ammon. 10 grains, Lassar's paste to 1 ounce.) which absorbs infected exudate and deals with it.

For persistent boils localized to one area, as the nape of the neck or perineum, there is no more valuable measure than X-ray therapy, and this is, in my opinion, the only proper treatment for carbuncles. It is claimed that the modern ultra-short wave diathermy is also in the nature of a specific remedy for carbuncles and boils, and my limited experience with this weapon has impressed me most favourably. With this qualification, however, I would insist that radio-therapy is the only rational measure to employ to-day in the treatment of carbuncles and operative interference should not be practised. This does not mean that such well-tried accessory measures as radiant heat, carbolic in glycerine compresses (1 in 8) or perchloride fomentations (applied for 10 minutes, not 4 hours) repeatedly replaced over a session of 1 hour or 1½ hours should be discarded. Treatment along these lines is applicable to subcutaneous abscesses, whitlows and perionychia where surgery should be limited to the incising of a bag of pus and carried no further.

Deeper septic affections often have a dermatological aspect as the gaping wounds exposing tendons following surgical treatment of cellulitis and osteomyelitis, the open wounds of compound fractures and sinuses from bones and joints reluctant to heal. Radiant heat is widely employed in this connection, but local ultraviolet light therapy and the local applications of cod-liver oil are measures, the value of which is not generally appreciated. Cod-liver oil is particularly useful and may be applied undiluted or in glycerine or boracic ointment; it seems to restrain connective tissue over-growth and to promote epithelial growth establishing a better balance between these healing processes so as to effect greater functional activity and a good cosmetic result.

Unfortunately no great progress can be recorded in the attack upon sycosis barbæ—that most resistent of pyogenic skin affections. X-ray therapy is of value, but has its very definite limitations, while the most effective local application, malachite green (hyd. perchlor. ½ per cent., brilliant green ½ per cent. in spirit) is too decorative to be appreciated unless the patient is in hospital. My own view of sycosis is that it is not primarily an infection of the skin but a reaction to sepsis in the nose or mouth, and though dramatic results may follow treatment of such findings, not all nose and throat sepsis is responsive to treatment, especially in those severe cases with a seborrhœic basis, which are probably dependent upon a metabolic dyscrasia and require dietetic and other general measures. Barber claims some success from vaccine therapy, but the consensus of opinion is that vaccines and staphylococcal toxoids are of little value in the treatment of skin sepsis.

PARASITIC INFECTIONS

Infection with the *Epidermophyton inguinale*, widely known as the cause of tinea cruris, is now most commonly seen in ordinary practice as the cause of ringworm of the toes, giving rise to an appearance of sodden "blotting-paper" skin in the outer cleft, associated with fissures and itching. Early cases readily respond to the use of Whitfield's ointment (acid. benzoic. 16 grains, acid. salicylic 16 grains, ol. coco. 120 minims, par. moll. to 1 ounce) or malachite green. Chronic cases are, however, very intractable and give rise to a serious problem since infection is readily conveyed from one individual to another in the home or institution, at baths or sports clubs. It may give rise to serious sequelæ, and I have recently seen two cases of recurrent lymphangitis of the leg from fissured ringworm infection of the toes. The dyes are the most convenient form of application, and probably most efficacious, but fractional doses of X-rays sometimes facilitate the cure in otherwise hopeless cases. Recently ½ per cent. paranitrophenol solution has been recommended for this infection and is of definite value. Semon has pointed out that better ventilation of the toes by wearing sandals is an advantage, and reference must be made to the desirability of sterilizing socks and shoes with formalin to prevent re-infection.

A new chapter was opened in the history of seborrhœic infections by the growth in 1926 of the pityrosporon from the "bottle bacillus" by MacLeod and Dowling, and the placing of this organism in the group of fungi imperfecta. It is now recognized that a great number of cases of flexural intertrigo are dependent for their persistence upon this and allied organisms, monilia and yeasts, and this has led to their more effective treatment by dyes as malachite green, 48S and similar preparations for persistent dermatitis under pendulous breasts, in perineum, groins and axillæ.

GRAVITATIONAL ULCERS AND ECZEMA

Few advances in treatment have been more welcome than that in gravitational diseases of the legs, affecting that great body of poor patients comprising the burdensome leg clinics of all hospitals in days gone by. It is largely through the work of Dickson Wright that the technique of elastic plaster bandage therapy for these conditions has been evolved, and though the principles underlying gravitational affections may have been understood for many centuries, no such ready and effective therapy has previously been introduced. This technique has been so well expounded in recent years that it is not necessary to repeat it here, but a tendency to easy abandonment of so valuable a remedy through trifling difficulties makes it desirable to indicate how these may be overcome. No one who has had the responsibility of treating thousands of these cases in the ordinary routine of out-patient practice would, I think, deny that Dickson Wright's treatment is the most practicable and successful available, and it would be a retrograde step to turn from it. It is worth while to take a little trouble in acquiring the art of applying these bandages effectively, and with even and adequate tension from the toes to the knee. The treatment is admittedly simple, but not so simple that success can be expected from the mere running of the bandage round the leg such as is sometimes done. It is advantageous to remove a little of the swelling by rest from a leg which is extravagantly œdematous, and in any case it is helpful to apply the bandage with the leg in a horizontal position resting upon a leg-rest. It is always necessary to apply side-pieces of elastic bandage, sometimes front and back pieces if there is any risk of the bandage cutting into the leg. Often tension is too slight rather than too great, so that irritation of the skin is facilitated. The bandage must be left in place as long as possible, usually 2, 4 or 6 weeks, and it is a mistake to endeavour to clean up an ulcer or a leg too effectively between dressings. Occasionally it is wise to cover a vulnerable patch with gauze or Unna's paste, and sometimes the whole leg is treated with Unna's paste before application of the elastic bandage as a protection against the irritation from that bandage. Another way in which irritation can be avoided is by applying the bandage in a reversed fashion (over supporting strips) so that it does not adhere to the leg but to itself; the bandage must, of course, be attached to the skin at the top and bottom of the dressing. Irritation of the skin is usually the result of mechanical trauma consequent upon the "tackiness" of the plaster, and it is rarely that it cannot be overcome in one or other of the ways indicated below. The use of sub-erythema doses of ultra-violet light or a fractional dose of X-rays prior to the application of the bandage is another protective measure which may be employed for this. Very rarely an individual exhibits an idiosyncrasy towards the resin in the plaster, and under these conditions it is usually quite impossible to leave any form of adhesive plaster near the skin, and reliance has to be placed upon Unna's paste or visco-paste, which is a convenient proprietory preparation in which the Unna's paste is incorporated in a bandage and can be wound straight on to the skin. This treatment cannot be mentioned apart from the use of sclerosing injections for veins—bandage therapy is a temporary means of reducing congestion and œdema, and if the source of the trouble lies in varicose veins a cure may be effected if these can be abolished. Sclerosing injections produce an artificial phlebitis and the resulting fibrosis obliterates the veins. Even though recanalization may, and often does, occur in the course of years, it is not a serious matter to have to repeat the procedure in order to save the patient from a relapse of gravitational troubles.

Much has been written upon injection technique and a number of procedures may be equally successful in practice. I use quinine-urethane or sodium morrhuate 10 per cent., and believe that successful thrombosis depends upon a few simple details. The leg should be at rest in a horizontal position to avoid the gravitational flow of blood in the veins; a maximum dose of 2 c.cm. is injected as high up towards the knee as possible, and the leg is kept in a horizontal position for five minutes after the injection, the site of the injection being bandaged. In this way a maximal irritation of the vein wall is achieved and usually an extensive thrombosis results obliterating the main and the tributary veins. Occasionally the thrombosis is so extensive as to necessitate rest in bed for a few days, but that is no disadvantage.

ULTRA-VIOLET LIGHT AND X-RAY THERAPY

Ultra-violet light therapy which was heralded with extravagant claims suffered the natural sequel in being decried as of no more value than a mustard plaster. After reasonable experience it is found to be of definite value, and is bound to retain an important place in skin therapy.

Lupus vulgaris is incurable without this measure. The technique of treatment is a simple one and can be conducted in private practice or in the home provided the apparatus and the time are available. I am convinced that the essentials of treatment of lupus are that the whole body should be exposed in sufficient dosage to produce a mild reaction, the time of exposure being gradually increased to maintain such reaction. Though for theoretical reasons this is not the general practice in this country, it is the practice in most large clinics devoted to the treatment of lupus, where the highest percentage of cures—60 to 70 per cent.—is obtained. Another point is that treatment should be given daily in a well-ventilated atmosphere, and preferably after a shower-bath, measures directed toward stimulating the skin. Tuberculous ulcers, scrofulodermia and chronic pyogenic dermatoses resolve rapidly under such treatment, but patience is demanded in the treatment of lupus vulgaris, which in an average case is continued daily for eighteen months.

Reference must be made to the treatment of psoriasis and lichen planus by ultra-violet light. Psoriasis is rapidly cleared by exposure to the lamp daily immediately after the patient has had a tar bath, the use of salicylic, mercury and tar ointment at night being desirable to remove scales. This result can, of course, be achieved by various measures, but none as cleanly as by tar baths and sunlight. Mention may here be made of cignolin (Bayer), a substitute for chrysarobin, which is much less irritant and does not stain clothes or skin so violently. It is used in an ointment in gradually increasing strength from 1 to 6 grains to the ounce until an effective reaction is provoked. Ultra-violet light is most valuable, however, in the treatment of the chronic psoriatic, if he can afford to purchase a lamp and take an exposure daily after his bath, as a part of his toilet routine. The majority of cases once cleared can maintain freedom more or less complete by this means. No doubt the measure simulates to some extent the climatic conditions which exist in those parts of the world where psoriasis is unknown.

Lichen planus in the acute and subacute forms is often responsive to intramuscular injections of mercuric-salicyl-arsenate (May and Baker), but when it is not or when this measure is contra-indicated, local direct treatment by ultra-violet light in sub-erythema dosage two or three times a week, is beneficial.

Superficial X-ray therapy is widely employed in a great number of skin affections. Unfiltered radiation is desirable, for little or no penetration is required. It is these rays which most readily provoke radio-dermatitis and its chain of grave sequelæ. Small doses do not provoke immediate damage, but the cumulative effect of fractional doses may be serious in later years. The more generally this measure is employed, the more must it be insisted that it is fraught with grave danger. It is imperative that measurement of doses and spacing of treatments should be accurate, and it is doubtful whether this weapon should ever be prescribed except by a dermatologist, and it should always be administered by one well trained in superficial therapy. Finally, it should be stressed that X-ray treatment is no cure for skin diseases, but is merely one measure which, when properly combined with general and local treatment, can determine cure. It is the indiscriminate use of X-rays as the sole treatment which leads to failure and disrepute.

Pruritus and eczema, seborrhœic and all other itching dermatoses are the conditions particularly amenable to radio-therapy. The measure has a sedative action, probably by direct effect upon the nerve fibrils in the epidermis.

In the treatment of acne X-rays are more effective than other measures because of their inhibitory effect upon the activity of sebaceous glands. In rosacea I know of nothing which will so regularly clear the eruption, it being essential in this instance to use an ointment in conjunction with the X-ray treatment, a weak sulphur ointment being most valuable.

ADVANCES IN TREATMENT OF VENEREAL DISEASES

By ROBERT LEES, M.B., F.R.C.P.E.

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RECENT advances in this department of medicine have been due rather to perfection of therapeutic methods previously used than to the introduction of new methods, and the limitations and the possibilities of existing methods have become better understood.

SYPHILIS

The greatest interest has centred round the treatment of late manifestations of syphilis, and in particular, syphilis of the central nervous system, and syphilis of the cardio-vascular system.

Central nervous system.—Malarial therapy is still in favour, and in early cases of general paralysis of the insane this treatment offers the best hope of lasting remission. It has proved that the earlier treatment is instituted, the better the prognosis. The age of the patient, the type of mental disorder or degree of mental impairment, even the amount of physical deterioration seems to be of relatively little importance compared with the duration of paretic symptoms. Patients not considered suitable for malaria therapy are those whose disease is of long duration or who have severe cardio-vascular disease. Even in advanced or bedridden cases, some improvement in physical and mental condition can be obtained by malaria therapy. Either tertian or quartan malaria may be used, and inoculation is usually by injection of 5 c.cm. of blood from another patient undergoing malaria therapy. After cessation of malaria therapy anti-syphilitic treatment must be continued. In cases where malaria is contra-indicated or is not available, fever may be induced by means of short wave radiation. Temperatures up to 104° F. have to be maintained for about two hours.

Tabes dorsalis.—Malaria therapy is of relatively little value in tabes but may be of use in resistant cases. The best results have been obtained by using tryparsamide and bismuth. Prolonged treatment is essential to produce the best results. At the same time all foci of infection should be removed. Tabetic pains are frequently relieved if such an area of infection can be eradicated. Tryparsamide is injected intravenously in doses of 1 to 3 gm. and bismuth should be used concurrently, given by intramuscular injection. A combination of these two drugs for intramuscular injection is now available as biarsamide and is given in doses of 5 c.cm. once or twice weekly. For the relief of tabetic pains no drug or method is specific, but some patients respond dramatically to the oral administration of atropine or ephedrine.

Cardio-vascular system.—The prognosis in syphilis of the cardio-vascular system is generally grave, as extensive damage has practically always occurred before clinical recognition is possible. In cases of syphilis of many years duration, it is of the utmost importance to examine the cardio-vascular system in detail at regular intervals. X-ray examination frequently detects early aortic disease which cannot be demonstrated by the usual clinical methods. In the treatment of cardio-vascular syphilis it is essential to use small doses of the drugs employed, to continue treatment for a considerable time, probably for the remainder of the patient's life, and to avoid drugs with an intensive anti-syphilitic effect. The arsphenamine (" 606 " and " 914 ") drugs should not be used at the beginning, and possibly should not be used at all, in the treatment of cardio-vascular syphilis. The best results are obtained by the use of iodides, bismuth in small doses, and mercury. The customary treatment for cardiac irregularities, or failure of compensation, should be employed simultaneously. It is of the utmost importance that the patient should re-organize his life to suit the damaged cardio-vascular system.

Bismuth.—The oil-soluble or " lipo-soluble " preparations of bismuth have recently come into favour. They have a high therapeutic value and are rapid in action. Absorption from the site of injection is completed in a reasonably short time and toxic effects are not pronounced. The preparations are relatively painless in use and it has been claimed that they have a greater power of penetration into the central nervous system and cardio-vascular system, but this is not completely proved. Examples of this type of preparation are neo-cardyl (May & Baker), sol-bi (Fraisse), stabismol (Boots) and bivatol.

Acetylarsan (May & Baker) is an arsenical drug with a limited amount of use and belongs to the pentavalent series. It is issued in ampoules containing 3 c.cm. and each 1 c.cm. contains 0·05 gm. arsenic. It is given by subcutaneous or intramuscular routes. Injections are painless, and the drug is absorbed and excreted rapidly. For an adult 3 c.cm. may be given twice weekly. For children it is issued in a dilution of one-tenth of the strength for adults under the name of " infantile acetylarsan." Acetylarsan may be employed when the arsphenamine group is contra-indicated, either because of previous intolerance or to avoid their more intense action. Children tolerate acetylarsan well and it has frequently given beneficial effects in debilitated cases of congenital syphilis. It has also been employed for adult patients with cardio-vascular syphilis, and for syphilis to patients suffering from severe albuminuria.

Intolerance to arsphenamine.—No practical method has been perfected to detect cases of idiosyncrasy to these drugs. Severe complications can be prevented by regular examination of the patient and inspection of the skin. Sodium thiosulphate intravenously in doses of 0·5 to 1 gm. is rapidly effective. In addition administration of calcium appears to have a very favourable effect on early cases of dermatitis. This may be given as calcium gluconate (Sandoz) 5 c.cm. of a 10 per cent. solution intravenously or intramuscularly, or calcium may be given associated with sodium thiosulphate. For example, calciostab (Boots) has been found extremely effective in the treatment of early arsenical dermatitis, in doses of 0·6 gm. daily injected intravenously for one week.

Diagnosis.—Flocculation tests have established their value; the Kahn test is widely used and is generally considered to be almost as useful as the Wassermann test.

LYMPHOGRANULOMA INGUINALE

This condition has been recognized more frequently in Britain in recent years, and although the majority of patients are infected in the Orient or Mediterranean, authentic cases have been observed where the infection was acquired in Great Britain. The usual manifestation of the disease is a pronounced enlargement of the inguinal glands, which may be unilateral or bilateral, and is often associated with a primary ulcerated lesion on the ano-genital region. The primary ulceration heals readily as a rule, but the glands frequently suppurate. The suppurative adenitis is extremely resistant to all customary forms of treatment, and chronic sinuses persist. The diagnosis can be established by Frei's test, i.e. an intradermal injection of an organism-free filtration of material aspirated from other cases. In cases of lymphogranuloma inguinale there is a marked cutaneous reaction. The reaction to this test is specific and tends to persist for life. As a rule the clinical characteristics are sufficient to make the diagnosis reasonably certain. The best treatment appears to be rest and intravenous injections of T.A.B. vaccine. It is best to begin with 50 million organisms and this should cause an abrupt rise of temperature to about 103° F. associated with headache and malaise, lasting a few hours. Injections are repeated at intervals of three or four days, the dose of T.A.B. vaccine being increased by about 25 million organisms each dose, according to the febrile and general reaction obtained. If the glands have suppurated and the pus threatens to burst externally, incision and simple antiseptic dressings are advisable. Some cases are benefited greatly by the injection intravenously of antimony potassium tartrate, 1 c.cm. of 1 per cent. solution may be given intravenously on alternate days, or stibamine glucoside may be given intramuscularly.

CHANCROID

The essential in treatment is to establish free drainage from the ulcerated area and apply weak antiseptics such as diluted eusol. Satisfactory results have been obtained from the intravenous injection of a vaccine of Ducrey's bacillus which is sold as "dmelcos." Each injection of vaccine usually causes marked pyrexial reaction. This vaccine may be used as a diagnostic test. A minute dose is injected intradermally, with suitable controls, and in cases of infection by Ducrey's bacillus a positive reaction is seen.

GONORRHŒA

The antiseptic treatment of gonorrhœa has not changed radically in recent years except that it has again been conclusively demonstrated that the use of antiseptics in a concentration that can damage the epithelial cells prolongs the disease and favours complications. Only weak concentrations should be used. Colloidal silver preparations are probably among the most effective and these should be applied gently to the surface. Methylene blue has recently been advocated and is instilled once daily in a concentration of 1 in 500. No distinct benefit results from the oral administration of the dye type of urinary antiseptic—e.g. pyridium or acriflavine, but they are helpful when there is superadded secondary infection.

Vaccines.—Vaccines are among the most valuable measures to counteract this infection. Attempts have been made to separate the antigenic from the toxic fractions of the protein of the organism, but vaccine prepared in this way (exotoxic vaccine) is not yet in general use, as there is not yet agreement as to the method of preparation and administration. The intradermal administration of vaccine appears to have definite advantages. When this route of injection is adopted the dose of vaccine should be about a third of the average dose given by subcutaneous injection. The injection is made into the skin so as to raise a wheal. Successive injections should be given in different areas of the skin, as the site of each injection tends to become indurated and also the skin for some distance round the area becomes inert, and appears to lose its immunizing powers for some time.

In the complications of gonorrhœa, such as epididymitis in the male and salpingitis in the female and arthritis in either sex, the administration of calcium by injection is of considerable benefit. If given at the onset of such complications the inflammatory reaction and exudation seems to be diminished and pain is relieved rapidly. Calcium chloride may be injected intravenously in doses from 1 to 5 c.cm. of a 1 per cent. solution. It is more convenient to use calcium gluconate in doses of 5 to 10 c.cm. of a 10 per cent. solution given either intramuscularly or intravenously. Injections should be repeated daily for several days.

Diathermy is of great benefit in gonococcal complications. The diathermy current raises the temperature of the tissues through which it is passed and it should be applied, if possible, to both the primary and to the secondarily infected areas. For example, it should be applied to an inflamed joint, where it produces rapid relief of pain and diminution of swelling, and also the primary source of the disease, for example, the posterior urethra. This has been simplified by the introduction of a new short-wave type of diathermy outfit and the danger of burning the patient has been markedly reduced.

In *ophthalmia neonatorum* proflavine in castor oil 1 in 1,000 solution has been employed, both as a curative and as a prophylactic application. This has the advantage that it stains the conjunctiva yellow for a few days and it is easy to ascertain that the antiseptic has reached the desired area. In addition the oily basis soothes the mucosa and retains the antiseptic in contact for a longer time. As an alternative may be mentioned colloidal silver solution prepared in a strength of 5 to 10 per cent. Neoprotosil and lunusol are suitable examples.

Serum diagnosis of gonorrhœa.—The serum diagnosis of gonorrhœa has become more securely established by improvements in technique, and the gonococcus complement-fixation test is regarded as specific and reliable. It is of little or no value in the diagnosis of recent and acute infections when the test is " negative " at first, but rapidly becomes " positive." It is of great value in the diagnosis of latent and chronic gonorrhœa and of metastatic complications such as iritis or arthritis. The test may be employed to test the response to vaccine therapy, and it should be used in tests of cure. A persistently strongly positive gonococcal complement-fixation test indicates a latent focus of gonococcal infection.

RECENT ADVANCES IN UROLOGY

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SINCE the most fundamental landmark in any branch of surgery is the adoption of Listerian and post-Listerian principles of cleanliness, and since the whole of the relatively short subsequent period may well be called recent in comparison with the thousands of years of pre-Listerian surgery, there is justification for a brief review of certain important urological advances, some of which, if not quite as recent as others which are fresher in memory or even now taking place[1], may prove to be of even greater importance and of more lasting value. Surgical diagnosis and treatment go hand in hand, and nowhere is the connection between the two closer than in urology. To deal only with operative technique and other therapeutic measures, in a survey of urological progress, would be to give a one-sided view of the picture. Therefore, since diagnostic advances are responsible for a great deal of the therapeutic improvement, no excuse is offered for grouping recent advances in urology under the headings of diagnosis and treatment.

DIAGNOSIS

Cystoscopy may be considered the key to modern urology. So frequent are the indications for its use, and so valuable its findings as regards both diagnosis and treatment, that it requires a distinct effort to imagine the condition of urinary surgery before the invention of the cystoscope in the last quarter of the nineteenth century. Without cystoscopy a large number of investigations and methods of treatment which are in daily use would be impossible. For instance, to mention only two important therapeutic measures, safe nephrectomy in renal tuberculosis and other conditions, and diathermy of vesical papillomas "per urethram," are closely dependent on efficient cystoscopy. Contra-indicated in acute urinary infections, acute retention of urine, chronic distension of the bladder, and renal failure, it is indicated in the investigation of hæmaturia and chronic urinary infections, in the diagnosis of urinary tuberculosis and enlarged prostate, in the diagnosis and treatment of vesical calculus, in the differential investigation of renal function, and for ureteric and intravesical instrumentation.[3]

Ureteric catheters or bougies are passed in order to compare the urine from the two sides, to determine, by the use of radiographically opaque instruments, the relation of the ureters to shadows in or near their line, to assist in the expulsion of ureteric calculi, to dilate ureteric strictures, to perform pyelo-ureterography, to wash out the renal pelvis in certain resistant cases of chronic pyelitis, and, if possible, to restore the urinary secretion in calculous anuria, and thus avoid the serious alternative of nephrostomy. Instances of intravesical instrumentation dependent on cystoscopy are the treatment of bladder growths with a diathermic electrode, the passage of a radiographically opaque bougie or catheter into a diverticulum, and the occasionally possible removal of a bladder stone through the cystoscope.

Almost equally, if not quite, as revolutionary as the introduction of cystoscopy was the application of radiography to urology. Complementary to cystoscopy in the diagnosis of vesical calculi, radiography is unrivalled in the detection of reval calculi. First applied to renal affections in the last few years of the nineteenth century, radiography has rendered obsolete the operation of exploring the kidney for a doubtful stone. The closeness of the link between diagnosis and treatment, and the greatness of the change effected by X-rays, are illustrated by Winsbury-White's statement that " it has long been the custom for urinary surgeons to hesitate to perform exploratory operation upon a kidney or ureter for stone in the presence of a negative radiogram."[9]

Dependent on, and an important development of, radiography, pyelography was introduced at about the first decade of this century. The following are its main indications :—

(1) Hæmaturia of renal origin, especially when unilateral. (2) Abdominal pain, again especially if unilateral, and of uncertain cause. (3) In order to demonstrate the relation of the renal pelvis and ureter to abdominal swellings of doubtful nature. (3) To show the relation of the same structures to radiographic shadows of doubtful nature in their neighbourhood. (5) Obscure cases of renal infection.

The main contra-indications to pyelography are :—

(1) Acute inflammation in any part of the urinary tract. (2) Severe chronic urinary sepsis. (3) Signs and symptoms of renal insufficiency, or, even in the absence of such signs and symptoms, advanced bilateral renal disease. (4) Age, emaciation, and general weakness. (5) Violent reaction to instrumentation. (6) Ability to make the diagnosis by other methods, especially in the case of renal tuberculosis or neoplasm.[4]

To mention only one therapeutic advantage conferred by pyelography, it has enabled the diagnosis of renal neoplasm to be made at an early and hopeful stage, and, instead of the traditional syndrome of hæmaturia, pain, and palpable tumour—too often a sign of inoperability—has substituted the need for early pyelography in all cases of unilateral painless renal hæmaturia.

Recently (1929) Lichtenberg and Swick, the former of whom was one of the originators of pyelography, have made this possible, without the need of a ureteric catheter, by means of the intravenous injection of uroselectan, a radio-opaque pyridine-derivative synthetized by Binz and Räth. Of a modification of this, uroselectan B, containing 51 per cent. of iodine, only 15 gm., dissolved in 20 c.cm. of water, need be injected, and its elimination is so rapid that radiograms may be taken 2, 5 and 10 minutes afterwards. Among the advantages of the intravenous method are the achievement of simultaneous bilateral pyelo-uretero-graphy and cystography at one sitting, without the mental and physical disturbance of cystoscopic manipulations, and the availability of the method when the cystoscopic route is undesirable, difficult, or impossible. Further, whereas ascending pyelography gives an anatomical demonstration of the renal pelvis and ureter, descending pyelography is a physiological method, the parts being undisturbed by a ureteric catheter or by artificial distension, and the time of appearance of the shadow after injection of uroselectan indicating the state of the renal function. Ascending and descending methods of pyelography are both extremely valuable in the diagnosis of hydronephrosis. In this condition obstruction to the outflow of uroselectan-containing urine tends to cause the pyelogram to approach, in density and sharpness of outline, that obtainable by the older method.

But, in cases of renal hæmaturia and suspected neoplasm without such obstruction, it is one of the main disadvantages of the intravenous method that the pyelograms are often blotchy, faint, and discontinuous, and lack the density and the clearness of detail and outline provided by ascending pyelography, and essential to the diagnosis or exclusion of renal neoplasms. The two methods are complementary, intravenous pyelography often rendering needless the more disturbing cystoscopic method, which, however, when full distension of the renal pelvis and clarity of outline are essential, retains first place.

CLINICAL METHODS

To turn from the preceding scientific advances to some achieved by clinical methods, it has been increasingly shown during this century that torsion of the spermatic cord is much commoner than is still generally supposed, and that roughly as many cases of torsion occur with complete as with incomplete descent of the testicle. Since, however, incomplete descent is much rarer than complete descent, it follows that incomplete descent is a predisposing cause of torsion. The difficulty of distinguishing strangulated hernia from torsion of the cord of an incompletely descended testicle has usually led to operative intervention and correct diagnosis. But the ease of excluding strangulated hernia when torsion affects the cord of a completely descended testicle, and the close resemblance of the latter condition to an acute epididymitis, have caused many such cases of torsion to be misdiagnosed as epididymitis, and account for the mistaken notion that torsion of the spermatic cord is found with incomplete descent much more commonly than with complete descent.

As for the diagnosis, it may be said that "in the absence of trauma, gonorrhœa, mumps, influenza, or tuberculosis, and with normal urine, prostate and vesicles, an apparent acute epididymitis, coming on suddenly, perhaps after a strain or during sleep, and followed by vomiting and constipation, especially in an adolescent, is probably a torsion. General and local signs of inflammation are consistent with this diagnosis, and of great significance are exquisite tenderness and the impossibility of differentiating testicle and epididymis."[5] The advantage of correct diagnosis is that early torsions may be untwisted at operation and even without operation; orchidopexy should then be done to prevent future torsions. Again, correct diagnosis of recurrent mild attacks of so-called epididymitis with normal urine, which are almost certainly attacks of torsion, will pave the way for orchidopexy, and thus save a possibly spermatogenetic organ before the onset of the final destructive attack of acute hæmorrhagic torsion. An accurate diagnosis made too late to allow untwisting to be performed, may, by means of orchidectomy, cut short acute pain and an otherwise slow convalescence.

Recent recognition of torsion of the hydatid of Morgagni or of other fœtal relics in the neighbourhood as a definite clinical entity has still further diminished the unsatisfactory group of cases of so-called idiopathic epididymo-orchitis. Torsion of the hydatid of Morgagni is of special interest to English writers as, although Ombrédanne described a case in 1913, its true nature was not appreciated, and it remained for Colt, Shattock, and Walton in this country to publish in 1922 the first accounts of torsion of the hydatid of Morgagni recognized as such at the time of operation. In fairness, however, credit for establishing its clinical syndrome is due to French writers, especially to Mouchet, who, since his first case in 1922, has operated upon over a dozen, the treatment being excision of the hæmorrhagic hydatid. One may conclude that the condition is comparatively common, and that its diagnosis is possible. Typically a lesion of the age of puberty, its first and main symptom is usually pain, which tends to diminish in a day or two. Clinically there is marked resemblance to torsion of the spermatic cord, the scrotum on the affected side being, as in that condition, swollen, red, and tender. The pain, however, is generally not as severe as in torsion of the cord, another difference being the usual absence of nausea, vomiting, and constipation. Further, in certain mild cases—" formes frustes "—with slight or absent scrotal œdema and redness, a tender mass may be felt at the upper part of the testicle, differentiable from both the body and the epididymis, and even appearing bluish through the skin. Incomplete descent of the testicle favours a diagnosis of torsion of the cord rather than of the hydatid of Morgagni. But the differential diagnosis, often difficult and sometimes impossible, is largely of academic interest. The practical point is that " most cases of spontaneous acute or subacute epididymo-orchitis at or about puberty, not preceded by any general illness, such as mumps or by trauma, and unaccompanied by any evidence of infection of the genito-urinary tract, are cases of torsion either of the spermatic cord or of an embryological relic within the tunica vaginalis—almost always the hydatid of Morgagni. For the great majority of such cases the best treatment is early operation."[6]

ADVANCES IN TREATMENT

To turn from diagnostic to purely therapeutic advances in urology, it may be recalled that Bigelow's introduction of litholapaxy in 1878, which Cabot considers " the most remarkable single achievement of American surgery,"[7] marked a new era in the treatment of stone in the bladder. It is nowadays difficult to imagine India and Egypt without litholapaxy. " Although," as Joly says, " stones were crushed before this date, the fragments were not evacuated, and the patient had to pass them as best he could. The old operation was rarely performed in a single sitting . . . . At the present time we hardly realize the importance of the advances made by Bigelow; one has to look up old case sheets and hospital records to do so. Before 1878 the average stay in hospital for a lithotrity (as the operation was then called) was from 100 to 120 days, and the number of sittings was from two to ten, or even more . . . . At the present time the operation is completed in one sitting, and the average stay in hospital is about five days."[2] The advantages of litholapaxy over lithotomy are the avoidance of a cutting operation, confinement to bed for days instead of weeks, and, in skilled hands, a lower mortality.

For the 10 per cent. or so of strictures which do not yield to simple dilatation, the development of internal urethrotomy has furnished a valuable substitute for external urethrotomy, the performance of which it has rendered a rare necessity for those experienced in urethral work. Among the advantages of internal over external urethrotomy are the avoidance of an external cutting operation and of a urinary fistula, a short convalescence of days not weeks, and a lower mortality.

A similar advantage in avoiding open operation was conferred by Beer's introduction in 1910 of diathermic coagulation of vesical papillomas by means of an electrode passed through a cystoscope. The advance was all the more welcome because of the marked tendency to recurrence possessed by these growths.

The further development of perurethral methods is illustrated in the last few years by the increased frequency of this approach to prostatic obstructions. McCarthy's name is prominent among those responsible for the instrumental improvements which have popularized this route. These improvements consist in the removal of strips of tissue cut away by an activated wire loop (sepsis being thus minimized) and in the general achievement of hæmostasis by coagulation. Perurethral resection of the prostate is at the present time being employed in different clinics in greatly differing proportions of cases, those for which it is most suitable seeming to be small prostatic enlargements, especially of the "middle lobe," and fibrous prostates (sclerosis of the bladder neck). Besides a low mortality and short convalescence, another advantage claimed is the possibility of post-operative paternity, which is almost unknown after properly performed suprapubic prostatectomy. However, the majority of prostatics truly requiring operation are at an age when their reproductive functions and those of their wives are in abeyance, so that the question of post-operative fertility can interest only the small minority who are below the usual age, or whose wives are relatively young.

Another and more doubtful indication for perurethral resection of the prostate is carcinoma, the advantage being that the act of micturition is retained, a permanent cystostomy being at least temporarily avoided.

In the very difficult problem of the treatment of the enlarged prostate, one of the most important advances has been the realization that the success of the operation depends largely on the adequacy of the renal function and, in patients in whom this has been impaired by back-pressure, on the institution of preliminary drainage, either by a urethral catheter or by a cystostomy tube. Recent additions to the tests of renal function are uroselectan pyelography and the urea-clearance test.

To the main methods of suprapubic prostatectomy—those of Freyer and Thomson-Walker—Harris has recently added a third, in which primary closure of the bladder is achieved. This desirable object is not safely attainable without careful study and experience of the highly specialized technique involved; and the nature of the operation and the time needed for its performance suggest that it is suitable only for the fitter patients.

In connection with incomplete descent of the testicle, Spence and Scowen have this year published favourable results in cases of incomplete descent treated by injection of gonadotropic (anterior-pituitary-like) hormones found in the urine during pregnancy. This treatment is based on Engle's demonstration that injection of extracts of the anterior lobe of the pituitary or of the urine in pregnancy into immature male monkeys is followed by descent of the testicles. In six of eleven boys aged 4½ to 15 years so treated the incomplete descent was unilateral, and in the remaining five bilateral. "The dose of gonadotropic hormone used in the majority of cases was 500 rat units injected intramuscularly twice weekly," and "of sixteen undescended testes treated with gonadotropic hormone, nine have descended into the scrotum in periods ranging from two to eleven weeks" (Spence and Scowen).[8] The results suggest the desirability of trying this treatment before resorting to surgery.

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RECENT ADVANCES IN THE TREATMENT OF FRACTURES

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THE great improvement in the treatment of fractures, which is one of the outstanding triumphs of post-war surgery, can be attributed largely to the establishment in recent years of special "traumatic hospitals" and fracture clinics in many parts of the world. In these, surgeons with real devotion and zeal for this hitherto neglected branch of the art of surgery have applied themselves unstintingly to it, with the result that what was once chaotic, uncertain, and frequently disastrous in its consequences, is rapidly becoming orderly, certain and successful. Of these treatment centres, Lorenz Böhler's Accident Hospital in Vienna is the most famous, and Böhler himself is the pioneer to whom, more than to anyone, belongs the credit for the rationalization of fracture therapy. Those who have seen him at work and have witnessed his results find it difficult to understand why the surgical world has been so slow to accept his principles and to adopt his methods: those who do so invariably become his ardent disciples.

It must not be imagined that modern methods of treatment are entirely free from danger, but an occasional disaster should not be allowed to outweigh their immense benefits, or to hamper their further progress and application. In the place of tedious and unsatisfactory reduction and fixation procedures, which often leave a limb with uncorrected deformity, defective union, stiff joints, and weak muscles, there is now available a system of therapy which can be relied on to produce complete recovery of structure and function in the shortest possible time and with minimal discomfort to the patient and interference with his ordinary life and work. The attainment of such an ideal is worth an occasional risk, but it must be emphasized that, by the exercise of constant care and supervision, the dangers of modern treatment can be reduced almost to vanishing point.

GENERAL PRINCIPLES OF MODERN FRACTURE TREATMENT

(i) Displacement must in every case be reduced exactly and under X-ray control.

(ii) The reduction of most fractures can and should be performed under local anæsthesia.

(iii) The reduction should whenever possible be carried out as an immediate and single procedure, to be followed at once by fixation of the fracture-site.

(iv) Fixation of the fragments must be absolute and must be continued without interruption until the fracture is firmly consolidated.

(v) Only so much of the limb should be immobilized as is necessary to secure absolute fixation of the fracture, the remainder of the limb being left free and unhampered.

(vi) The fullest possible functional use of the supported limb must be insisted on from the first.

In brief, the modern treatment of fractures comprises three things—absolute and immediate reduction, absolute and prolonged fixation, maximal functional use during the period of fixation. Admittedly, these ideals are not yet fully attainable in all fractures, but their range of application is extending, and it certainly includes nearly all cases which ordinarily come under the care of the general practitioner.

Local anæsthesia for fractures.—Local anæsthesia has now become definitely established as the ideal anæsthetic for fractures, and every medical practitioner should become familiar with its technique. It can be used in almost any fracture, but it is particularly suited to fractures of the more superficial bones, (radius, ulna, humerus, tibia, fibula, clavicle, and those of the hand and foot). Best results are obtained in really recent fractures, as the presence of a fluid hæmatoma is an important factor of success. Unfortunately it is not suitable for small children or highly nervous patients.

Although I have employed local anæsthesia in more than three hundred fractures I have yet to see any harm result from it. Its important advantages are :—

(i) It dispenses with the need for an anæsthetist.

(ii) It produces full muscular relaxation (rarely obtainable with gas), and usually absolute freedom from pain.

(iii) It is easy, entirely safe, rapid in action, and free from all the dangers and disadvantages of general anæsthesia.

(iv) The analgesia lasts two to three hours, thus providing ample time for X-ray diagnosis, reduction, fixation, X-ray confirmation, and further attempts at reduction should the first prove a failure.

(v) It is particularly useful in general practice, and for reductions under the X-ray screen.

Technique.—A 2 per cent. solution of novocaine is employed in general, but I mostly use 4 per cent. to diminish the quantity of fluid injected. A 10 or 20 c.cm. syringe, armed with a long needle, is introduced through an intradermic wheal over the fracture, and pushed in until blood can be withdrawn. This shows that the hæmatoma has been reached, and the injection is now completed. Within three minutes analgesia commences, and becomes total five to ten minutes later. The sites of injection, the number of infiltrations, and the quantity of anæsthetic vary with the fracture (see later).

The reduction.—The surgeon of to-day must always aim for and obtain an immediate and exact reduction of displacement ; he can no longer be content with anything less. Exact alignment means a minimal mass of repair tissue (blood clot, granulation tissue and callus), and rapid union of the fracture without deterioration of the soft parts. Residual deformity or delayed reduction leads to an excess of repair tissue, which obstructs surrounding vessels and lymphatics, and so favours chronic œdema and congestion; this results in delayed union, owing to hyperæmic decalcification of the fragments, and also interferes with the recovery and function of neighbouring muscles and joints. It is becoming increasingly obvious that no amount of massage or of physiotherapy can undo the damage caused by incomplete or unduly delayed reduction.

The accurate reduction of a fracture requires:—first, an exact appreciation of the deformity and of the several elements of displacement which constitute it; secondly, an understanding of the factors and forces responsible for the displacement; and thirdly, a plan of procedure which aims at the correction of all the elements of deformity, and at the same time counteracts or neutralizes the deforming forces. It may be pointed out that of the three procedures in use for the correction of displacement (immediate reduction, continuous traction, and open operation) the modern tendency is to employ immediate reduction to the exclusion of the other two.

In many fractures immediate reduction can be effected without special apparatus, the deformity being corrected by manual traction and counter-traction, with direct manipulation of the fragments (forced movement), and the adoption of corrective positions (unforced movement). In other cases exact reduction can only be obtained with the help of apparatus. Böhler has introduced several reduction-frames acting on the principle of screw traction, and each suitable for a special bone. Figs. 1 and 2 illustrate a simple reduction appliance made for me by a hospital carpenter, which is more widely applicable, and with which obstinate fractures of every long bone except the femur have been successfully reduced. It should be observed that reduction apparatus only provides a means of applying immediate and powerful mechanical traction, and does not always obviate the need for direct manipulation or for the adoption of corrective positions.

In difficult fractures immediate reduction by apparatus may be combined with skeletal traction, the pull being exercised on a wire or pin inserted into the distal fragment, or into a convenient bone (e.g. the os calcis) distal to the fracture (fig. 1). The traction wire may either be removed after the reduction, or it may be left in situ and incorporated in the fixation plaster (fig. 2), or used for continuous traction, should this prove necessary after all. Every reduction should be confirmed by X-rays, and difficult fractures should

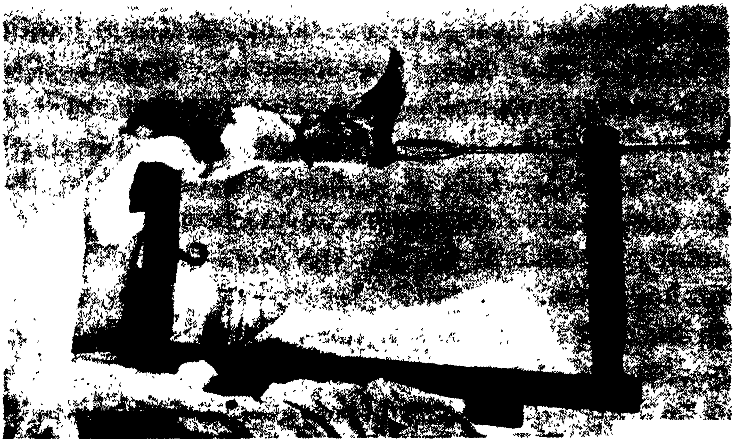


FIG. 1.—Author's screw traction reduction frame in use for reduction and plasterof Paris fixation of severe compound fracture of leg.

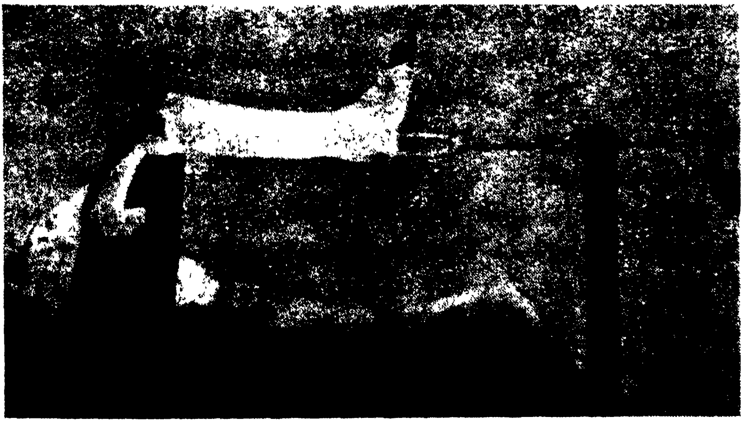


FIG. 2.—Author's screw traction reduction frame and plaster of Paris fixation of severe compound fracture of leg.

be reduced under the screen.

The fixation.—The factor on which the modern treatment of fractures stands or falls is the unpadded plaster of Paris cast, of which Böhler is the chief exponent, and in the space of a few years this has made obsolete almost every other form of splint and fixation appliance. The cast is a sandwich, several layers thick, made by unrolling a plaster bandage on itself, until a slab of the desired length, width, and thickness is constructed. This is applied to the naked limb immediately after displacement has been reduced, and carefully moulded to fit the contours and bony prominences of the part; the reduction procedure is continued until the plaster has set quite firmly. With a well-made cast the fracture is rigidly immobilized, the patient is made completely comfortable, and the limb can be used at once.

That the unpadded cast introduces drawbacks and dangers is not denied, but there is no other splint with which a fracture can be immobilized without interfering with the free functional use of the limb. The dangers are mainly those of vascular obstruction and can be greatly diminished by constant supervision and care; in Böhler's hands they have been rendered negligible. The construction and application of unpadded casts is by no means as simple as it sounds. Indeed, considerable experience and skill is needed to attain success, but the revolutionary changes these casts can effect in the immediate and remote results of fractures makes the attainment of this skill and experience indispensable to every progressive practitioner.

For further details of plaster cast construction the reader is referred to the excellent little monograph by F. Schnek, of Böhler's clinic (" The Technique of the Unpadded Cast "). Before leaving the subject, however, it should be pointed out that complete encasement of the fractured part is not always necessary, and that many fractures can be efficiently fixed with a cast which embraces two-thirds or three-quarters of the circumference of the limb. This type of cast is quite free from the danger of vascular obstruction.

The after-treatment.—The plaster cast must not be taken off until the fracture is soundly consolidated, except when its removal is demanded by threatened vascular obstruction; even then it can often be divided longitudinally to relieve constriction, without interfering with the fixation. In no circumstances is removal of the cast permitted for massage or movements. Supported by an unpadded cast, the fractured limb soon becomes painless and comfortable, and can be used to a surprising degree. Patients with a Colles' fracture can type, drive a car, and perform light manual work after the first day or two, while cases of fractured leg or ankle can often walk with a stick immediately the plaster is firm. Functional use dispenses with all need for massage and physiotherapy, and ensures a maximal range of joint movement and muscular contraction. In general, all function may be permitted which does not cause pain or swelling.

Premature removal of the cast is always followed by curtailment of function, may cause return of pain and swelling, and in the lower limb is often responsible for non-union. The actual duration of fixation varies with the fracture, the patient's age and condition, and other factors, but the following figures give a safe average :—

Colles', elbow, clavicle, metacarpals, metatarsals, phalanges—3–5 weeks.
Radius, ulna, scaphoid (recent fracture)—5–7 weeks.
Humerus, ankle, tibia—6–8 weeks.
Fibula, tibia and fibula, severe Pott's—8–10 weeks.

MODERN TREATMENT OF SOME COMMON FRACTURES

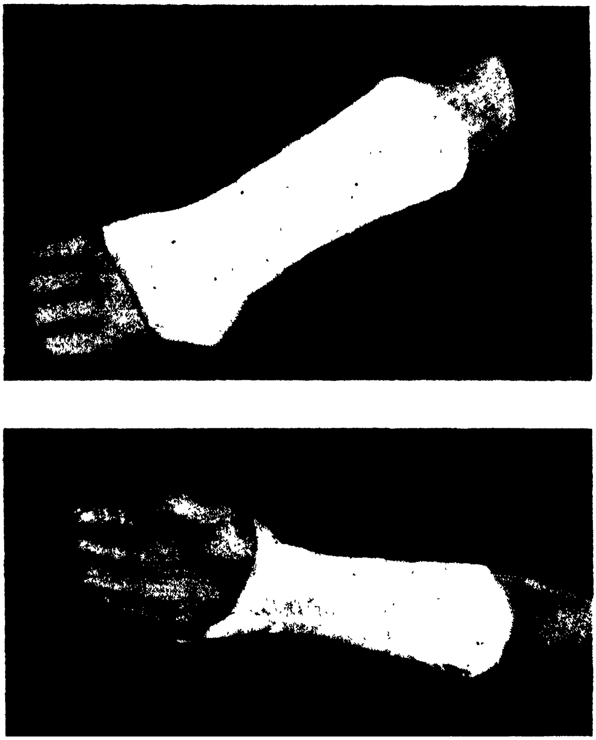
Colles' fracture.—Impaction must be broken down and displacement, whether severe or slight, must be reduced. Local anæsthesia is induced with 4 per cent. novocaine and any œdematous swelling is dispersed with firm massage in a proximal direction. Usually three injections will be needed if full analgesia is desired. The first injection is made into the hæmatoma on the dorsal side of the fracture (5 c.cm. of 4 per cent.); the second into the inferior radio-ulnar joint, also from the dorsum (1 c.cm. of 4 per cent.). The third is the only difficult injection as it has to reach the hæmatoma in front of the fracture: the needle is inserted from the outer edge of the radius at the level of the fracture, and pushed in deep to the radial artery and tendons, keeping close to the bone (about 3 c.cm. of 4 per cent.). Within five minutes analgesia is usually complete and the reduction is commenced. For this a "direct" method should be employed, grasping each fragment with a finger and thumb grip, and breaking down impaction and obtaining alignment by forced movement of the distal fragment in the directions opposed to the deformity. A preliminary X-ray is an essential guide to manipulative reduction. In most cases alignment is easily and obviously obtained, and the reduction proves stable (i.e. there is no tendency to redisplacement when the correcting manipulation is discontinued).

Occasionally reduction is difficult or proves unstable, owing to gross impaction or comminution of the fragments, or because of severe œdema or hæmorrhagic swelling. For such fractures Böhler's indirect reduction procedure has no equal:

> The flexed elbow is fixed by a strap to a hook in the wall, while the surgeon grasps the thumb with one hand, and the three radial fingers with the other, and disimpacts and reduces the fracture by a powerful longitudinal pull, at the same time bending the hand in a palmar and ulnar direction. He then gives the hand of the patient to an assistant, who maintains the traction (pulling mainly on the thumb), while the surgeon completes the alignment by direct manipulation, and if there is much comminution or "spreading" of the fragments, by compressing them between his thenar eminences. Traction is continued during the application of the cast,

and until this sets firmly.

The unpadded plaster cast is prepared as soon as reduction is obtained. A dorsal cast of Cellona bandages is employed, about six layers thick, embracing three-quarters of the circumference of the limb, and extending from two inches below the elbow to a little above the knuckles (see fig. 3 and 4). The cast is closely moulded to the wrist and round the fractured radius, fits snugly round the thenar and hypothenar eminences, and should give good ventral support to the carpal bones. The moulding is continued until the cast is moderately hard, when it is secured with two circular layers of loosely applied plaster bandage, or with starch bandage. The position in which the wrist is fixed is important; the best is one midway



FIGS. 3 and 4.—Unpadded plaster cast for Colles' fracture (note freedom of hands and fingers, with firm fixation of radius).

between pronation and supination, with slight dorsiflexion and moderate ulnar adduction of the hand (see fig. 3). A confirmatory X-ray must always be obtained, and if this proves unsatisfactory the plaster should be removed and a further attempt made at reduction while the local anæsthetic is still acting.

After-treatment is started at once. The patient is instructed to flex, extend and spread the fingers; at first he may have to assist the injured hand with the sound one, but the movements must be performed to the fullest possible extent from the start. The patient should also be told to rotate the hand and to move the elbow and shoulder through a full range. Moderate use of the hand should be encouraged from the start, and increased rapidly after the first day or two. Many patients can continue at work without interruption, and others can resume after a few days' rest; heavy manual labour is an exception. The plaster should not be removed until after the third week, and in severely comminuted fractures and elderly people it may with advantage be retained for another week.

Fracture of the clavicle.—Although this common fracture rarely fails to unite, it generally does so with considerable and unsightly deformity. The explanation of this lies in the action of two powerful deforming forces, the weight of the arm and the contraction of the powerful shoulder-girdle muscles, which tend to pull the shoulder and the outer fragment downwards, inwards and forwards. Almost all the numerous methods of treatment in common use are quite powerless to overcome these deforming forces.

The primary reduction of displacement is rarely difficult. In one method the surgeon pushes his knee against the back of the sitting patient, and pulls both shoulders strongly outwards and backwards, at the same time lifting the injured shoulder. A better way is to place one fist in the axilla and lever the outer fragment into position over it by pressing the elbow into the side. An injection of 5 c.cm. of 4 per cent. novocaine renders this manipulation painless. To preserve anatomical alignment the shoulder must be maintained in the correct position (well up, well out, and well back) until the fracture unites (3–5 weeks). Fair results are obtained by keeping the shoulders braced back with clavicular rings, with the "three-slings" method, or with a horizontal back splint. But perfect alignment can only be produced by the following three methods :—

(1) *The recumbent treatment,* in which the patient lies on her back for three weeks, with a sandbag between the scapulæ and the shoulders kept well back; this is so tedious that only women of the leisured classes will tolerate it.

(2) *The double plaster of Paris spica,* in which plaster bandages, passed round the padded shoulders and crossed at the back, fix both shoulders in full correction. Unfortunately this appliance is so irksome to the patient (who cannot bring either hand to the mouth or face), that it can be used only in exceptional circumstances.

(3) The *axillary wedge,* originally used by Desault, and intelligently modified by Böhler, is a somewhat cumbersome appliance, but maintains excellent alignment. A piece of board is padded in the form of a gothic arch and fitted into the axilla; it is fastened to the trunk and opposite shoulder by iron hoops and by belts, while the arm is left free for movement and function.

Fig. 5 shows another application of the axillary wedge, which I designed three years ago: it can be seen that the shoulder is held well up and back by a plaster axillary support, which is fixed by two uprights to a plaster pelvic band. I have found this plaster excellent in children and lightly-built women, but it is difficult to make it strong enough for heavy or muscular men. As can be seen in the illustration, the arm is left quite free for functional use.

Fractures of the lower end of the humerus.—The treatment of these fractures presents special difficulties. Reduction is far from easy, and fixation is complicated by the development of marked œdematous swelling, which makes the adoption of a flexed position of the elbow dangerous. Moreover, fractures near the elbow are intolerant to treatment by massage or early movement, and certain complications tend to occur which influence both treatment and prognosis.

Reduction and fixation are much easier in a very recent fracture, i.e. before there has been time for swelling to occur. Local anæsthesia is induced by injecting 5–10 c.cm. of 4 per cent. novocaine into the hæmatoma round the fragments; unfortunately, many of the patients are quite small children who may need a general anæsthetic. The usual deformity is a backward and upward displacement of the lower fragment, which is also tilted back by the triceps, and may be pulled in (to the ulnar side) by the pronators. To obtain reduction the surgeon pulls strongly on the extended forearm, until he can feel the small fragment move down; he then, without discontinuing the pull, flexes and pronates the forearm to a right angle. Reduction is completed by applying the two thumbs against the back of the condyles and pushing the lower

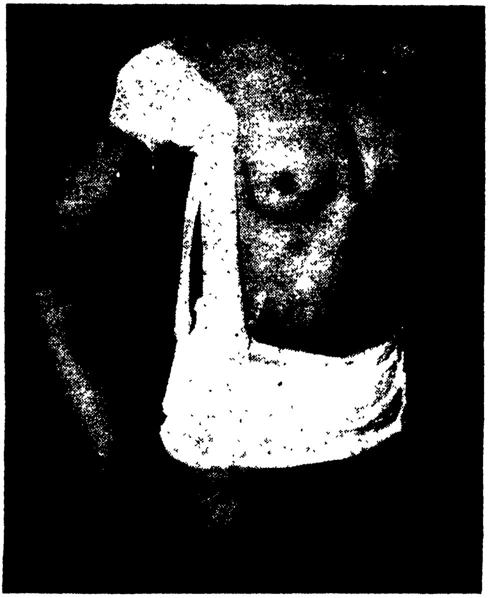


FIG. 5.—Author's axillary plaster splint for fractured clavicle.

fragment into exact alignment.

Fixation is the real problem: alignment is best maintained by immobilizing the elbow in full flexion and pronation, but the full flexion, assisted by post-traumatic swelling, may so obstruct the circulation that either Volkmann's contracture or actual gangrene may result. For this reason the elbow should be immobilized at an angle of not less than 50 to 70 degrees, depending on the amount of swelling. Pronation of the hand undoubtedly helps to prevent inward displacement, as was first shown by Böhler, and is certainly more rational than the position of full supination usually employed in this country.

The best agent of fixation is a plaster of Paris bandage, applied as a figure-of-eight round the padded wrist and the proximal part of the padded upper arm (Fig. 6). The crossing of the bandage is well away from the elbow, ample room being left for swelling. After a week the plaster is removed and another applied with the elbow nearer to full flexion. This is kept on for another two or three weeks, by which time union is firm. For several weeks the elbow will remain stiff, but this stiffness always disappears provided: (i) the patient is encouraged to work it off himself, and without

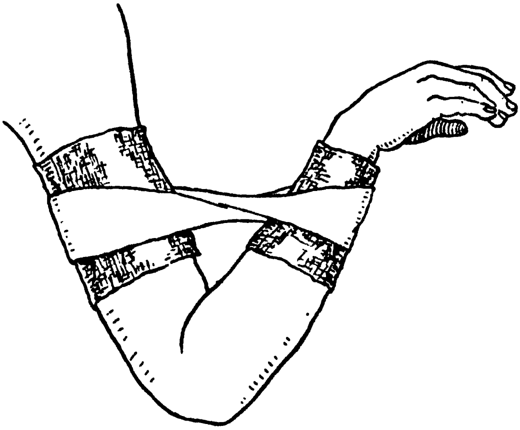


Fig. 6.—Figure-of-8 plaster of Paris bandage for fractures of the elbow.

any massage or passive movements; and (ii) great care is taken to preserve a full range of active flexion of the joint.

Fractures of the ankle.—The common injury is a fracture of the external malleolus caused by violent eversion or abduction of the foot (Pott's fracture). When the ligaments and internal malleolus are intact no displacement occurs, and the injury is known as a first degree Pott's fracture. In the second degree fracture either the internal ligament is ruptured or the inner malleolus broken off, and the foot is dislocated in an outward direction; at the same time there is some upward displacement, with shortening of the fibula, while not infrequently the foot also goes backwards owing to fracture of the posterior margin of the lower end of the tibia.

In first degree fractures a walking-plaster (see fig. 7) can be applied at once and the patient walks in comfort and safety from the first day. Second degree fractures are more difficult to treat, particularly if reduction has been delayed and the ankle and foot are swollen; the earlier the reduction the better the result. The essential step is the reconstitution of a closely-fitting tibio-fibular mortice for the astragalus, and the exact re-alignment of the broken fibula. After preliminary X-ray examination, local anæsthesia is induced by injecting 5 c.cm. of 4 per cent. novocaine at each malleolus, and the œdematous swelling is pressed out by firm massage until the outline of both malleoli can be felt clearly. The patient then sits on a table in front of the seated surgeon, with his knee bent to relax the tendo Achillis. The surgeon grasps the foot with one hand and the leg with the other, and deliberately corrects every element of deformity by pulling the foot well down and pushing it inwards until the astragulus is felt to impinge on the inner malleolus. Any backward displacement is corrected by pulling the heel forwards until full dorsiflexion of the ankle is obtained, and finally the two malleoli are strongly pressed together and made to grip the astragalus firmly.

The walking plaster is now applied (fig. 7). Two unpadded casts are prepared, three and six inches in width, eight layers thick, and of suitable length.

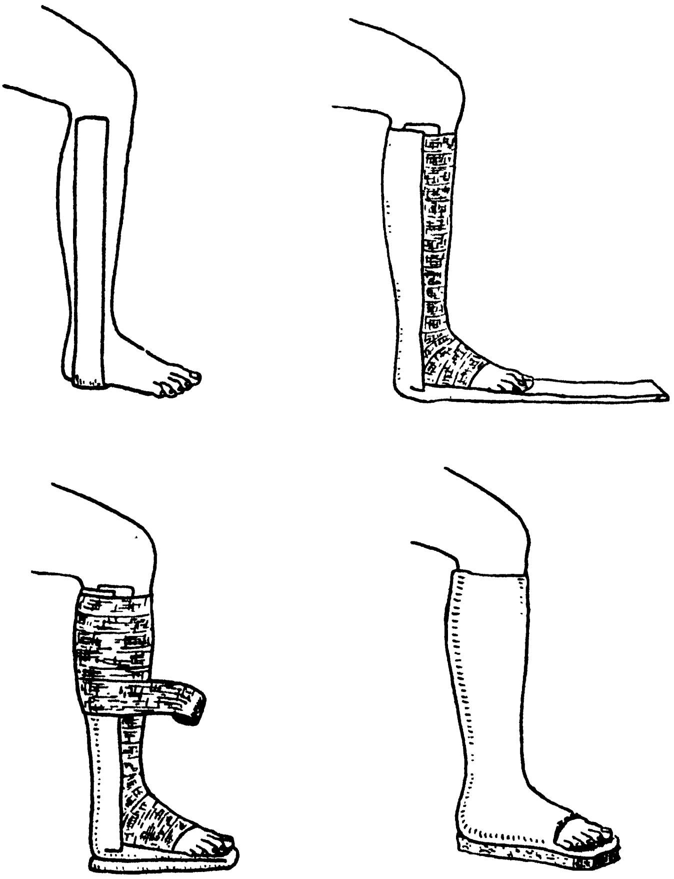


FIG. 7.—Stages in construction of walking plaster.

The narrow cast is applied in the form of a U to the sides of the ankle and leg, well pressed in over the malleoli, and fixed with one layer of wet gauze bandage. The wide cast is then applied to the back of the leg and the sole, the projecting part being turned back on itself to make a strong sole plate; two notches are cut in the heel and the corners folded over to fit the awkward contours of this part. The cast is accurately moulded to the limb and well pressed in at the ankle, and is fixed by a second layer of wet gauze bandage. While the casts are setting reduction must be maintained by constantly pressing the foot in and the malleoli together. Finally the splint is completed with two layers of circular plaster bandage, but the toes are left exposed so that the circulation can be observed. A confirmatory X-ray should never be omitted. A piece of sorbo rubber is then cut to the shape of the sole and glued on to the sole-plate of the plaster. Instead of this, a U-shaped walking iron may be incorporated in the plaster (see fig. 8).

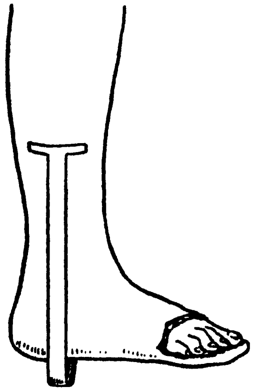


FIG. 8.—Böhler's walking iron (to be incorporated in walking plaster).

Owing to the interposition of the two casts and the wet gauze bandages there is little danger of constriction being caused by the thin circular covering of plaster, but a careful watch must still be kept for the first day or two. The toes and knee must be moved frequently and the patient can walk with a stick at once. At first walking should be indulged in for a few minutes at a time and the leg rested frequently, but within a week the patient can walk freely and unaided. The walking plaster is kept on for eight weeks.

The worst fractures, with gross displacement and swelling, should spend a week in bed, with the leg supported on a frame (e.g. Böhler's leg splint), continuous traction being exerted on a pin or wire through the os calcis. Fig. 9 illustrates this treatment, but in this case there was wide separation between the tibia and fibula, with upward displacement of the astragalus (Dupuytren's fracture); to reconstruct the ankle mortice the two malleoli are seen pressed together, intermittently and for short periods, by a special screw vice or redresseur, which is ordinarily employed by Böhler for crush-fractures of the os calcis. After the week's traction there should be little or no swelling and any residual displacement can be reduced

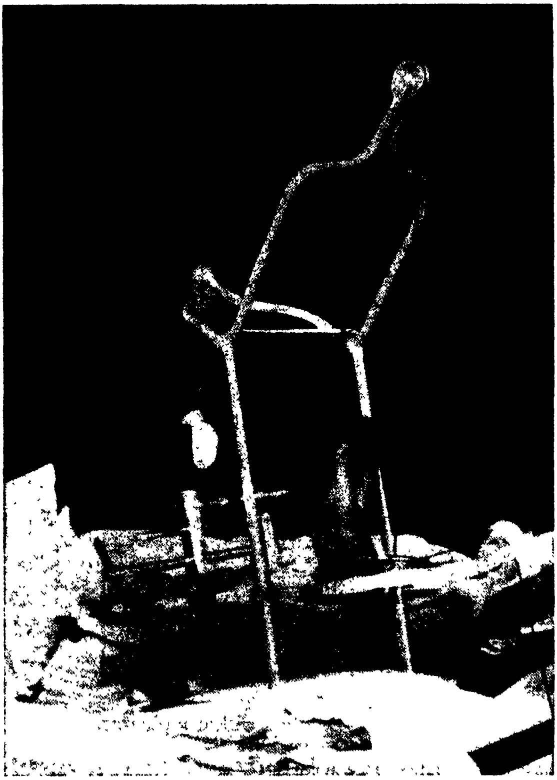


FIG. 9.—Skeletal traction for severe fracture of ankle (with compression of malleoli).

by manipulation; the walking plaster is now applied in the ordinary way.

Fractures of the leg.—The common oblique or spiral fractures of the tibia in children, associated with little or no displacement, do extremely well with a Delbet's walking plaster (fig. 10), which is also an excellent appliance for simple fractures of the fibular shaft.

Severe fractures of the tibia or of both bones, usually seen in adults, are associated with gross displacement, and are frequently compound. They should be reduced at once by skeletal traction in a reduction frame (see fig. 1), under local or spinal anæsthesia, and preferably with the aid of the X-ray screen. The reduction appliance illustrated in figs 1 and 2 has been found ideally suited for these fractures, although Böhler's screw-traction leg frame is now employed extensively for the same purpose. While alignment is being maintained in the reduction appliance a fixation plaster is put on without padding, the os calcis

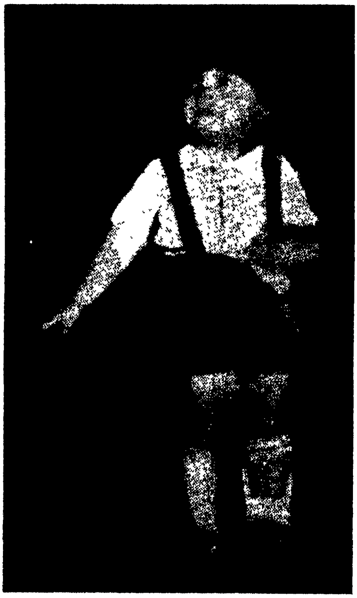


Fig. 10.—Delbet's walking plaster.

traction-wire being cut short and incorporated in it. For the worst cases Böhler uses a second wire passed through the proximal fragments and also incorporated in the plaster; redisplacement is made impossible as the two wires hold the fragments rigidly in the plaster.

In fractures at or above the middle of the bones the knee must be incorporated in the plaster. Fig. 11 shows how this can be done without completely

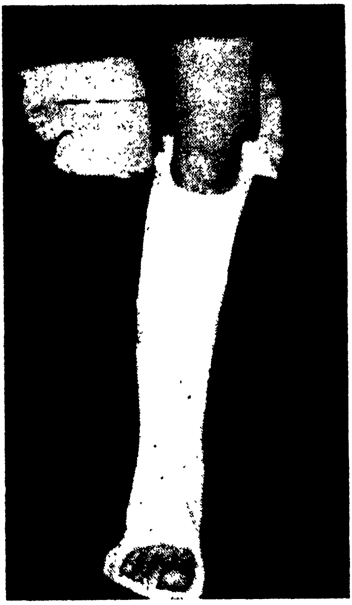


FIG. 11.—Walking plaster for fracture of tibia and fibula.

abolishing knee movements; by closely moulding the plaster round the tuberosities and tubercle of the tibia it can be made to bear part of the weight. When there is any chance of vascular obstruction the plaster must be split down the front and the patient should rest in bed for a few days: the danger period over, the plaster is strengthened with a layer of circular bandage, a sorbo sole-plate or a U-shaped walking iron applied, and the patient encouraged to walk with sticks. The walking plaster should be kept on for at least ten weeks.

SOME RECENT ADVANCES IN SURGERY

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TO attempt to compress many of the recent advances in surgery into the compass of a short article would be impossible. What adds to a reviewer's difficulties is that he must be prepared to acknowledge that this or that particular "advance" is but a revival or a modification of some bygone practice. I propose to cater for the average reader, whose attitude is "a fig for theory; give me ocular demonstration." It is proposed to take him round the hospital wards and show him some surgical innovations.

Continuous intravenous saline.—This is one of the greatest additions to our therapeutic armamentarium. Here it may be seen in use in three cases. The first is a patient who had a partial gastrectomy yesterday. He has absorbed seven pints of normal saline and glucose into his venous system in 24 hours. The rate of flow is now set at forty drops per minute. The patient there is having his urinary bladder decompressed slowly for acute on chronic retention; he, too, is having continuous intravenous saline* and it has been running for five days into his radial vein. By its agency it is hoped to stimulate his impaired renal activity. There, again, is a third example of its use. The patient is gravely ill with acute purulent arthritis of the hip joint, which has been drained. The object of the saline in this case is to dilute the circulating toxin.

Dri blood transfusion.—Blood transfusion has been so simplified and is used so generally today that one wonders how we managed without it. Drip transfusion, recently introduced by Marriott and Kekwick, is administered by the same technique as continuous intravenous saline, the only difference being that oxygen is bubbled through the container and this keeps the citrated blood well stirred and aerated. Its indications, as far as we know at present, are somewhat limited. This patient has obstruction of the common bile duct which has been left too long already. This being so he is being left twenty-four hours longer while he receives drip transfusion, which will be continued during the operation.

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* Continuous intravenous sodium sulphate (42·85 grammes Glauber's Salt in one litre of water makes an isotonic solution) is an even better diuretic (H. Wade and I. L. Dick).

Thyroidectomy for toxic goitre.—No branch of surgery has advanced with greater rapidity than that of the treatment of toxic goitre. Pre-operative medication with Lugol's solution has been a wonderful advance, and the profession owes a deep debt of gratitude to Plummer of the Mayo Clinic. After suitable preparation, this patient had bilateral thyroidectomy performed two days ago. The operation was carried out entirely under local anaesthesia with one per cent. novocaine, without adrenaline, delivered through a portable pump. The only basal anaesthetic was one-third of a grain of morphine. No muscle of the neck was cut. After the skin flap had been dissected up the thyroid was exposed through a mid-line vertical incision. Only a tiny fragment of each lateral lobe remains, and this preserves the parathyroids and the recurrent laryngeal nerves. Already the patient is a changed woman—less apprehensive and in every way calmer. The pulse-rate was 90 at 8 a.m. to-day, the lowest reading since she entered hospital.

Thyroidectomy for heart failure.—Complete thyroidectomy, removing the whole gland but leaving some parathyroid tissue, is being used, especially in America, for the treatment of heart failure when compensation has failed and for angina pectoris. The thyroidectomized patient's metabolism is greatly reduced, consequently the call of the tissues for oxygen-containing blood is such that even an impaired heart can cope with the lowered standard of activity required of it, and patients previously bedridden have been able to get about and even resume light employment.

While on this subject, I must refer to three other conditions where surgery is trying to help the medical castaway, namely, Addison's disease, syringomyelia and urinary incontinence.

Addison's disease.—Here is a patient who has been asked to attend today for you to see. Certainly her complexion is dark, but it is nothing compared with what it was four months ago. At that time she was bedridden, constantly having " fits," and now and then vomiting. She was then a typical example of advanced Addison's disease, and in spite of all manner of suprarenal extracts there was no improvement. I grafted the suprarenal glands of a baby who died three hours after birth into the patient's rectus sheath on either side. Before the operation her blood pressure was 80 mm. Hg or under and to-day it is 124. She says she feels immeasurably better, and is able to attend to her household duties. How long the grafts will continue to function I cannot say, but the method is full of hope.

Syringomyelia.—R. E. Kelly, of Liverpool, in conjunction with H. Cohen, has treated ten cases of syringomyelia—a condition which is not amenable to any other treatment—by surgical means. After laminectomy, a communication is established between the central fluid-containing cavity and the subdural space. Improvement has been evident in a number of instances. Cecil Wakeley and Dickson Wright, who have also performed this operation, have had a measure of success.

Incontinence of urine.—There are an increasing number of cases recorded in which complete urinary incontinence, both in the male and the female, has been remedied by making a new sphincter urethræ out of the gracilis muscle. The cause of the incontinence is immaterial, except that, of course, the muscles of the lower limbs must not be paralysed.

Continuous aspiration of the stomach.—This patient is a lucky man. His life was saved by the skill and promptitude of the Sister-in-charge. Ten days ago he had prostatectomy performed by Harris's method, the technique of which is another notable improvement. In his case enucleation of the prostate was difficult. Suddenly, about 24 hours after the operation, he vomited. It was an enormous vomit of that ominous dark brown material which characterizes acute dilatation of the stomach. Without a moment's hesitation the Sister raised the foot of his bed on blocks and soon afterwards passed a small stomach tube. She aspirated an enormous quantity of that peculiar fluid, and after washing out the stomach, left the tube in position throughout the night. Owing to the exceedingly efficient treatment there was no further trouble.

Continuous aspiration of the stomach is a form of therapeusis capable of extended application. In many instances it is a life-saving measure. The nasal route is particularly good. After cocainizing one nostril and the back of the throat a small stomach tube can be passed down the oesophagus. The patient can drink as he pleases and the fluid is aspirated as soon as it reaches the stomach. This spares him the effort of vomiting, and the need for jejunostomy in cases of obstruction and intractable paralytic ileus grows less.

Electro-surgery.—Instead of using the scalpel, tissue can be divided almost bloodlessly with the diathermy knife. In certain cases diathermy excision and incision of tissue is a notable improvement. Here is an example of its use. This little boy lost his left kidney two years ago because of a pyonephrosis. He was admitted exceedingly ill with oliguria—the small amount of urine passed was full of pus. X-ray examination showed an enormous stone in the only existing kidney. Under local anaesthesia, supplemented with a little gas and oxygen, the kidney was exposed and a large incision was made into it with the diathermy knife. The stone was removed almost bloodlessly, the operation being completed by temporary nephrostomy.

Partial pancreatectomy.—The diathermy knife has also helped in the surgical attack on the pancreas. Half the pancreas has been removed successfully by J. A. Berry for hyperinsulinism. Several instances of limited growths of the pancreas have been removed successfully recently.

Surgery of the thorax.—Tudor Edwards writes: " It is probable that more advances have been made in this subdivision of surgery than in any other ". With this statement all must agree. Truly marvellous is the progress made in lobectomy and thoracoplasty. Here is a small, but important, example of improvement in treatment; the child is having an empyema treated by the closed method. After a little local anaesthetic had been injected a tube was introduced into the pyothorax between the ribs, using a Cantlie's trocar. A water-tight junction between the tube and skin has been accomplished by the excellent method introduced by McEachern of Winnipeg. Layers of cotton wool soaked in collodion are applied around the junction and, so as to incorporate this with the tube, pieces of cotton thread are sewn through the catheter and their long ends intermingled with the layers of collodion-soaked wool.

When to drain an empyema has always been a difficult problem, which is now much simplified by the practical method introduced, I believe, by Prof. Witts. Some of the purulent fluid recovered by aspiration is put into a test tube and allowed to stand overnight. If, in the morning, eight-tenths of the contents of the tube are solid, the empyema should be drained. It there is more clear fluid than this above the purulent coagulum it is usually wise to wait for a few days longer.

Gallie's graft.—Fascial grafting for the repair of hernia, at any rate in my practice, has become almost a routine. It adds very little to the operating time and one feels that one is giving the patient a form of repair that is going to last. That fascial strips do live was shown by a case I had a few months ago. A year previously I constructed a fascial hammock for a movable kidney and slung it over the twelfth rib. The patient returned with pain along the twelfth nerve, which had been caught up in the fascia, and the region had to be reopened. There was the fascia, after all this time, just as it had been put in—glistening and unchanged in texture. The patient before us had a large ventral hernia which has been repaired by darning it with strips of fascia lata. The operation was carried out under spinal anaesthesia in order to try to obviate a recrudescence of bronchitis, for constant coughing proved too much for the absorbable sutures used on the previous occasion.

Appendix abscess.—This patient was admitted on the fourth day of an attack of acute appendicitis. He had a localized lump in the right iliac fossa, about the size of an orange. The extent of the lump was marked on the abdominal wall with an indelible pencil. He is being nursed in a high Fowler's position and is given water only by the mouth. I feel fairly confident that the lump will resolve. Not for one moment am I showing this case as a recent advance; it is rather to give you the pulse of thought on the Ochsner-Sherren regime at the present time. My colleague, McNeill Love who is interested in the question, tells me that the method is gaining in popularity, especially in some of the large provincial centres.

The other day I read that the highest mortality for acute appendicitis in the United States of America was at Salt Lake City, Utah, Oak Park, Illinois, and Nashville, Tennessee. At Nashville they introduced, or possibly re-introduced, the Oschner-Sherren regime in selected cases with a satisfactory reduction in the mortality figures.

One of the factors in the high mortality of acute appendicitis is purgation for abdominal pain; in America, as in Britain and probably everywhere, there is much trouble from the abuse of purgatives. In all seriousness I believe that the Philadelphia Medical Society are on the track of a great advance when they recommend " stickers " on the postal envelopes bearing the following :—

> WARNING
>
> In the presence of abdominal pain :
>
> Never give a laxative.
> Give nothing by mouth.
> Apply a hot-water bottle.
> Send for your doctor.

The tannic acid treatment of burns.—This young girl had severe burns of her face, chest and abdomen. She has been treated by the tannic acid method, which in my view is a marvellous improvement. The treatment originated at the Henry Ford Hospital, Detroit. The burnt area must be cleansed most thoroughly before the tannic acid is applied. The strength of the tannic acid solution employed has been made stronger and stronger, and in this case we used a forty per cent. solution in flavine applied with a brush. There is now a leathery, almost black, coagulum covering the burnt area. On no account must this become moistened or the toxins which are locked up in it will become liberated. A very good method to prevent soiling and soddening when the burns involve the trunk of a child is to paint the coagulum with " new skin ", or collodion, and thereby make a water-tight dressing.

ADVANCES IN PHYSICAL TREATMENT

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ONE of the advances in physical therapy recently before the public eye is treatment by joint manipulation. The question is often asked why the medical profession has been so slow in adopting it. There are two good and all sufficient reasons. First, the primary duty of the medical practitioner is to guard the patient from harm; and second, as a necessary corollary, it is his duty never to prescribe treatment unless, and until, it has been brought into conformity with the known laws of anatomy, physiology, pathology and psychology. Joint manipulation, as practised outside the medical profession, has been known for generations in this country as "bone-setting." More recently, chiefly in the United States, osteopathy has gained many adherents. The "bone-setter" claims to reduce dislocations—which in fact are not present—or to slip "the little bone back into place," when, often enough, the "little bone" does not exist. The osteopath claims that the most important single factor in the production of disease is the "spinal lesion," and that the most important single factor in treatment is the correction of that "lesion." The most recent cult of all—the chiropractor—holds somewhat similar views.

All that can be said is that none of these claims can be brought into accord with the known laws to which reference has been made, and therefore those who believe in them accept a creed which is untenable by medical practitioners as a whole. Therefore the latter were more than justified in refusing to prescribe treatment based upon a creed in which they had no faith.

For many years past a few medical practitioners have realized that joint manipulation should find its rightful place in medical treatment, and have studied it patiently until it was possible to place it on a scientific basis. This has now been accomplished, thanks mainly to the study of the living anatomy of joints and the physiology of joint movement. No longer need joint manipulation be attached to an impossible creed: it may be prescribed with the certain knowledge that there is scientific justification for what is done.

It is true that the technique of manipulation is not yet familiar to the profession as a whole, and some time must elapse before the recognition of suitable cases for this treatment becomes common knowledge. Yet a great advance has been made, and in part at least it is a recent one. At the same time it must be remembered that tension is the most valuable of all manipulations, and the value of this was well known to Ling more than a hundred and fifty years ago. His head-suspension apparatus remains as a most valuable asset in the hands of those who practise manipulation of the joints of the spine.

MASSAGE

Fortunately the day when massage was deemed to be the be-all and end-all of treatment has passed away, and has been replaced by the far more rational teaching that function begets return of function, which is the objective of all treatment. The Chartered Society of Massage and Medical Gymnastics (as the old Incorporated Society of Trained Masseuses is now called) has now ten thousand members and already many of them are highly skilled in joint manipulation, and it is hoped that only a few years will elapse before this is the universal rule. Members of the Society are pledged not to accept professional work except on the prescription of a qualified medical practitioner, and this is the great menace that free-lance practitioners have to face again now, as they had to do in the past. They have been largely eradicated from the massage profession; and there is little doubt, that with patience and loyalty comparable to that shown by their predecessors, the Chartered Masseurs and Masseuses will provide all that is needed in the special branch of physical medicine which is now known as manipulation. This will render unremunerative the work of the free-lance practitioners that remain. Doubtless others will take their place, but only to meet with short-lived success.

An advance, which made slow progress at first, but which has moved rapidly forward of recent years, has been the change in the view that Swedish Gymnastics as taught by Ling must be kept inviolate. Not only have views modified as to the desirability of retaining the whole of the Swedish system intact, but it has been recognized that other systems have a definite value both from an educational and remedial point of view. Foremost amongst these is the system based on dancing, while many of the old Swedish exercises proved to be of doubtful utility, have now little more than historical value. At the same time, the basis of all sound remedial work remains that of Ling's teaching and, as it has survived the test of over a hundred and fifty years, is likely to continue.

The use of slings for joint and muscle movement, and the use of the weight and pulley, are valuable adjuncts in physical treatment. These found no place in the Swedish system. The popularity of Zander apparatus, which at one time seemed likely to become a prominent feature in physical treatment—largely owing to the work done at the Grand Palais in Paris and the Anglo-Belge Hospital at Rouen during the War —has waned in this country at least.

TREATMENT OF FRACTURES

Though many would be found to deny it, the work of Lucas-Championnière still survives in the treatment of injury. His aim was to introduce the immediate treatment of fractures and other injuries by massage and passive movement, so as to prevent subsequent stiffness, loss of strength and of co-ordination. The difficulty so far as the treatment of fractures is concerned, lay in the fact that until union is relatively firm, the medical practitioner must either perform the treatment personally or at least supervise it daily. So few medical men found this a practical proposition that the method of treatment has proved to be of very limited application. Nevertheless the treatment is now widely accepted for injuries not associated with fracture, and even in fracture treatment the duration of rigid fixation has been largely reduced. In the later stages, physical treatment is used more and more, till now it is almost a routine demand. Almost the only notable exception to this is to be found in Böhler's clinic in Vienna, where no provision is made for physical treatment. Excellent as may be the results of treatment in this clinic, it seems to many in England that they might be still farther improved were the omission of rational physical treatment remedied. The difficulty, no doubt, would be to secure the adequate training of the technicians.

One point in the recent report on the treatment on fractures and their treatment drawn up by the Committee of the British Medical Association, is not clear, namely the extent to which physical treatment has contributed to the improvement in results when patients are treated in properly organized clinics. Rest from movement and rest from function are two entirely different things and this was the main basis of Lucas-Championnière's teaching. It is becoming recognized more and more in the treatment of all cases of injury.

ELECTRICAL METHODS

The use of the surging faradic current has improved greatly in technique during recent years, but there is one new development of the use of the current which still lacks explanation. It has been found that cutaneous sensation to faradism is often disturbed when no alteration to other forms of stimuli can be detected. When an area of skin is found to be sensitive in this way, exposure to a third-degree erythema dose of ultra-violet light will often remedy the defect. In this way pain is often reduced as a symptom, and a great advance has thus been made in bringing relief. More recently still the use of the galvanic current over the exposed area has sometimes been found to be of greater service than either exposure to the light or treatment by galvanism alone. It is thought that this is one way of giving histamine ionization, using the light to generate the histamine.

On exposed areas the mark left by the light is undesirable and histamine ionization may be used instead. It is usually attended by a more severe general reaction than the other method, but it is transitory. At present it must be supposed that the faradic test reveals irritation of terminal nerve filaments by deposits in their neighbourhood. There is no doubt that the treatment produces marked reaction in the lymph spaces, and the excess of lymph presumably suffices to stimulate the removal of the source of irritation. When the area of sensitiveness to the current can be reduced to a pin-point, the usual practice was to suggest the use of the galvanic needle. This had many disadvantages, not the least being the pain of treatment. Success also depends entirely on the patient's testimony that the exact spot has been found. Equally good, and often better, results are secured now by recourse to the treatment previously known as "needling," the modern difference being the use of a hypodermic needle. The skin is anæsthetized with a 4 per cent. solution of novocaine and then the area is infiltrated deeply with a 1 per cent. solution. The needle is passed freely to and fro throughout the suspected area during the process of infiltration. The treatment concludes with a dose of deep and vigorous massage over the infiltrated area.

The whole proceeding is practically painless, and the introduction of the fluid no doubt tends to stretch the tissues materially, and thus, presumably to tear any minute adhesions that may be present. If a large area is involved—as for instance after a wide subcutaneous hæmorrhage—subcutaneous infiltration with oxygen will often bring relief when all else fails. So, too, the use of dry cupping has gained in favour in recent years in the treatment of this condition, and of many others in which massage is of known service.

Another great advance has been rendered by the use of ultra-violet light in Paget's disease and in cases of osteoporosis. These are no longer incurable conditions, though six months of unremitting treatment is essential. It is, however, now safe to promise that not only will the downward progress cease with treatment, but that pain will be relieved at least to a large extent, and that the ravages of the disease in the bony structure will undergo some degree of repair. Naturally nothing can be done to alter contour or deformity already present when treatment starts.

HEAT

In the application of external heat, two comparatively recent advances have been made with the introduction of the infra-red rays and of wax. There is no doubt that the lack of surface irritation with the infra-red rays makes it possible to give far greater doses of radiant heat than could be given with the ordinary incandescent lamps. Of the penetrating properties of the rays as yet little is known but there seems to be evidence that they are the exact reverse of those of the X-rays.

With regard to the use of wax, to obtain to the full the therapeutic effect, the part to be treated should be immersed in a bath of melted wax maintained at the requisite temperature 115°–120° F. Other methods, such as pouring on melted wax, or melting wax on to the part under some external source of heat (such as the infra-red and incandescent lamps), are far less valuable. The technique of treatment is as follows :—

On immersion of, say, a hand, into such a bath, a film of wax forms at once, especially if the hand is held immobile in the medium. The part to be treated should then be moved slowly and continuously in the bath for the duration of the treatment. This is usually ten to fifteen minutes. If the movement of the part is for any reason contra-indicated, the wax itself should be kept in motion with a stirring rod. By this means the maximum heating effect can be obtained, and this is prolonged by wrapping the treated part, on removal from the bath with its adherent coating of wax, in waterproof sheeting until cool.

It seems, however, that as the result of somewhat extensive clinical trial, wax treatment possesses definite properties other than those attributable purely to heat alone. On the removal of the cooled wax film, a marked sudorific effect is noticed which persists for some time; the skin is supple and in an ideal condition for subsequent massage; adherent scars are loosened, and stiff and painful joints are looser and definitely less sensitive to manipulation. This form of treatment has been used widely for the stiff hand and foot, whether the stiffness is due to an arthritis of a systemic nature, an after-effect of local sepsis (e.g. a palmar abscess or whitlow) or a sequel of injuries, such as cut tendons and fractures. Judged by clinical results, this is probably the best form of heat for application to the extremities. Some circulatory disturbances of the extremities seem to derive marked benefit from this treatment. To obtain the full effect however, treatment must be in a bath.

Recent advances in physical treatment also include the many advances made in electro-therapy and in radiation treatment other than those mentioned. Some of these are dealt with elsewhere in this issue (p. 540). Foremost amongst these are the disinfecting action of diathermy when applied to the cervix uteri, and the more recent discovery of the use of short-wave therapy. The use of anodal galvanism in the treatment of recent injury is also one of primary importance.

SOME RECENT ADVANCES IN MEDICAL ELECTRICITY

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SHORT-WAVE THERAPY

TREATMENT by high frequency and ultra high-frequency currents, commonly known as short-wave and ultra short-wave therapy, is much discussed to-day. It represents a notable advance in physical medicine and has great therapeutic possibilities, but it is by no means a universal remedy. Those who prescribe it blindly and uncritically for every sort of ill without knowledge of its indications and limitations and without regard to the important technique essential to its successful application, are doomed to disappointment. Those, on the other hand, who have followed its development abroad and have sifted out the reliable evidence of authoritative workers and have studied their methods and results, are convinced that, for certain well defined conditions, this branch of physio-therapy supersedes all others and that, in experienced medical hands, it is entirely devoid of risks.

In this country the development of short-wave therapy has suffered from several adverse factors. Our students learn little or nothing of its aims and possibilities and physio-therapy here is still the neglected step-child of medicine. Exploitation by the medically unqualified represents a serious damage to the development of all physio-therapy in England. If there is one branch of physio-therapy that needs medical judgment, experience and acumen, it is short-wave therapy.

Spark-gap machines also represent a hindrance to full development. There is much discussion to-day as to the relative merits of spark-gap and valve machines. Spark-gap apparatus is comparatively cheap and easy to use, robust and long lived. In spite of their high frequencies they can only produce damped oscillations, short intervals of maximum energy interrupted by long pauses; forno matter how many spark gaps are placed in series to back each other up, damping is individual in each one of them. They cannot, therefore, produce pure wave-lengths but bands of radiation with many harmonic frequencies. Their chief drawback however, is their failure to produce thermo-penetration which is one of the chief attributes of short-wave therapy, completely distinguishing it in results and in method from diathermy in which the electrodes are placed directly on the skin. This is not the case in short-wave therapy in which the part treated is separated from its condenser electrodes by one to two inches of insulation, the best being glass and air for much loss of energy is caused by using rubber and felt. Thus the part and its insulating layers form the dielectric which lies in the condenser field and is permeated by lines of force. This represents a circuit of exceedingly high resistance. Now the output of even the best spark-gap on the market to-day is only 150 watts, whereas the three valve machines of Siemens, the "Ultra-Pandoros" with 650, the "Radiotherm" with 350, and the "Ultra-Therm" with 300 watts, have the necessary energy according to wave-length used and work demanded of them. Compared with these, spark-gap machines, although useful for treatment of rheumatism and many superficial conditions, are insufficient for treating deep-seated organs of the abdomen and pelvis or skull. They produce heat but it is a skin heat not deep heat. They have nothing in common with short-wave therapy but the name, for the distinguishing quality of this, depth effect, falls away.

VALUE OF SHORT-WAVE THERAPY

Short-wave therapy is the nearest approach to a true or corrected metabolism which can only be brought about through cellular or tissue stimulation, specifically directed to a definite area but in which the whole organism benefits because it combines both the chemical and physical principles necessary to the body as a whole. Is all this due to heat or are there effects other than heat? The vexed questions of specific action and of biological effect are still controversial. Specific action of two kinds can be distinguished:—(1) The specific action of short waves in general, Schliephake's great discovery, in the treatment of acute inflammation of pyogenic origin and on chronic infections and deep-seated lesions which, in the past, have proved refractory to the inadequate penetration of diathermy; and (2) the much-disputed specificity of the wave-lengths in the short-wave portion of the spectrum. Is there any other effect beyond that of heat and is there any selective action in these wave-lengths? The idea of selection and of the biological effect of wave-lengths although held firmly by the pioneers, Schliephake, Pflomm, Liebesny and others, has been received in some quarters with scorn and derision. Conflicting results of this kind are largely due to want of uniformity of technique in experimental work. At the Radio-Biological Congress in Venice, 1934, Castaldi gave a lucid summary of the experiments in this field and of the present standpoint regarding the biological action of ultra-high frequency currents, which should be read by all workers on this subject.

INDICATIONS

It is always well at first to avoid too wide a field of indications and to try to limit those used to a few well-defined conditions and to work these as much as possible on experimental lines, with definite control by X-rays, temperature charts, photographic and chemical examination. Short-wave therapy cannot do much more than any other form of treatment for chronic arthritis of the hip joint when X-rays show complete destruction of the cartilage and other degenerative changes, nor is it an economical method of treating advanced cases of polyarthritis. The best and most convincing results will always be shown by holding fast to the idea of the general specific action of short wave therapy, that is its unrivalled success in the treatment of inflammatory conditions, not only of chronic and sub-acute, but also of acute and purulent conditions where diathermy is a serious risk. This applies not only to inflammatory conditions of antra, sinuses, ears and throat, but also to furunculosis, carbuncles, hydro-adenitis, to many joint inflammations, acute mastitis and other much more deeply seated lesions. In all these the more acute the disease, the better and quicker is the result.

The first effect of the hyperæmia caused by the short waves is the relief of pain. The temperature comes down promptly and swelling is reduced. This means an increase of the blood current in the whole inflamed area and better exchange of fluids between the capillaries and the tissues. Pflomm has found this hyperæmia unusual in that it remains for hours, sometimes days and cannot be abolished by adrenaline. He attributes it partly to heat and partly to inhibitory effects on sympathetic tone and to stimulation of the vagus. With it are associated chemical changes in the blood, towards acidity, and an activation of the calcium ion. This action affects the capillaries resulting in increased absorption and thickening of the injured capillary walls so that micro-organisms cannot pass. This, no doubt, is the reason for the rapid effect of short waves in lowering the temperature where bacterial infection is known to be the cause.

A case of puerperal mastitis recently seen showed this in a dramatic way. The patient had a simple abrasion of the nipple. When first seen the pain was terrible, the temperature was high and inflammation was spreading rapidly through the breast. An abscess appeared imminent. The first treatment in the condenser field with a wave length of 6 metres relieved the pain and brought the temperature down. After four more treatments the inflammation had disappeared and operation was avoided.

These immediate effects of short-wave therapy and the fact that it can be used in every stage of inflammation, acute and chronic, are its great advantages. It would appear that they represent something more than hyperæmia. Whether or not the ultra-short waves have a selective action or a lethal effect on bacteria is a big problem, by no means yet solved. What is clearly seen is the remarkable hyper-leucocytosis, an increased phagocytosis and an attenuating effect on the virulence of the invading micro-organisms with rapidly raised resistance both local and general. These are the benefits of short-wave therapy which give it great superiority over diathermy.

It would be reasonable to expect that many chronic conditions would also respond well to this form of treatment.

For example a man aged 50 had a chronic infection of the mastoid, a sub-acute condition of the right antrum, complete deafness in one ear and greatly impaired hearing in the other. X-rays showed much thickening of the antrum, and the cells of the right mastoid area were cloudy and ill-defined from old infection. Immediate operation was advised for the mastoid. This could not be done at the time and short-wave therapy was tried. The results of treatment in the condenser field with a wave-length of 5 metres were that in twenty treatments the antrum had entirely cleared up and the mastoid cells showed definite improvement as regards clearness of outline.

Less well known perhaps is the influence of short-wave therapy on many cases of hepatic insufficiency. The patients who have benefited most have had recurrent attacks of hepatitis with jaundice and enlargement and tenderness of liver. Their spleens were palpable, their stools were typically pale and the urine contained bile and indican. They all recovered and the recurrent attacks have ceased.

Gynæcological conditions might not at first sight appear a favourable field for short-wave therapy on account of the deep and difficult anatomical position of the adnexa, the absence up to the present of a suitable electrode for internal treatment and of reliable means for estimating the heat effect in the interior of the pelvis. In spite of these difficulties external treatment through the pelvis on one or both sides in turn is eminently successful owing to the anti-inflammatory effect of the short waves and their immediate effect in removing pain. This is clearly shown in the treatment of chronic salpingitis associated with ovarian inflammation and adnexitis, even with the presence of inflammatory masses in the parametrium. All this produces a condition of chronic misery and invalidism. Short-wave therapy acts well here, often better than operation, which is not in every case the best treatment for this class of patient.

Nothing has been said here about the general effects of high frequency currents for the production of artificial therapeutic fever in the treatment of progressive paralysis of the insane or tabes dorsalis, as opinions regarding the use of pyrotherapy are still varied. Although much used in America, those who have used it in Europe have not yet come to definite conclusions. Wagner-Jauregg, although he believes suitable cases improve under short-wave therapy, still prefers malaria treatment.

In conclusion it may be stated that short-wave therapy is not a panacea for all forms of disease. It has some contra-indications but they are few. Its indications are many and varied. No risk whatever is attached to its use in careful hands. It is in its infancy and sufficient time for final judgment has not yet elapsed, but it opens out vast possibilities for the future and it cannot be neglected, even by those who profess to find all its benefits in diathermy.

ACTINOTHERAPY

Actinotherapy appeared for a time to go completely out of favour. Pronouncing against its value except in the treatment of rickets, the Medical Research

Council dealt a blow from which it is only recovering with difficulty. Many years have passed since then and actinotherapy has stood the test of time. Now, on the basis of a great body of experience, its advantages and limitations can be discussed from the point of view of the general practitioner. Whether he uses it himself or not, he must understand its indications, advantages and limitations, and he should know enough of its technique to enable him to advise, criticize, and modify its application.

Ultra-violet light is absolutely essential in many cases of calcium deficiency. For rickets it is a specific, and cod-liver oil is a less potent agent in certain instances, as shown by the case of premature infants who frequently develop rickets in spite of treatment by cod-liver oil. What is still not sufficiently realized by the general practitioner is the extreme value of ultra-violet light in pregnancy and lactation. Impoverishment of reserve of calcium salts represents serious risk for mother and child, but it can easily be prevented by radiant energy. The ionic calcium content of the blood is also definitely low in some allergic states such as asthma and hay-fever. As regards hay-fever, if patients who do not respond to calcium or to a combination of calcium and thyroid alone were irradiated as well, twice a week, for three or four months before the dreaded period of hay-fever, there would be much less suffering and misery in June and July.

Calcium deficiency is also found in delayed union of fractures when the normal increase then to be expected in adults does not take place. Here even general applications of ultra-violet light permit mobilization and utilization of calcium. Calcium is also necessary to maintain the adrenaline content of the blood when lowered, as in auto-intoxication and in sympathetic and endocrine disturbances. Here also ultra-violet light is of great use.

The symptoms of the climacteric are relieved by general ultra-violet light baths, the possibility of acting through the skin producing a permanent lowering of the marked hypertonia of the sympathetic and thus relieving distressing symptoms, waves of heat and exhausting sweats, as well as nervous symptoms. Chronic backache, when symptoms are only due to strain of muscles and ligaments, will yield to irradiation by luminous heat, or infra-red light with massage and proper support for the weak muscles.

Actinotherapy triumphs in the treatment of surgical tuberculosis, where it is a great adjuvant. This condition, however, requires the resources of the general hospital or institution. The best general light treatment for surgical tuberculosis is that of a powerful carbon arc lamp. Provided that it is powerful enough, it best fulfils the conditions of solar radiation. The local treatment of all these manifestations of surgical tuberculosis, whether lupus or adenitis, or multiple tuberculides, or tuberculous peritonitis, demands very varied treatment and much experience on the part of the actinotherapeutist. Erysipelas is a condition that the general practitioner may at any time be called upon to treat, and prompt application, of ultra-violet light from an ordinary quartz lamp, with a sufficient erythema dose, will relieve pain, reduce the temperature, limit the spread, and prevent vesiculation.

There are two special conditions in which the general practitioner will find great opportunities for using actinotherapy : one is the treatment of dermatological conditions and the other is the treatment of catarrhal conditions in the nose and throat. In the treatment of skin conditions generally, the more the local manifestation is regarded as an indication of a constitutional derangement, the more efficacious will treatment be. An infected antrum or ethmoiditis may be behind a seborrhœic dermatitis; dental or tonsillar sepsis is more often than not the cause of obstinate eczema or acne rosacea. Ultra-violet light will not give immediate benefit in these cases so long as some underlying focus of infection persists, but, in conjunction with other measures, the writer has seen remarkably curative influence in these cases and many others, and even in the obstinate condition of pruritus ani. In all these, as well as in the after-treatment of tonsillitis, antral, and sinus infection, and in all catarrhal conditions of nose and throat, after the focal cause is removed, that most vitalizing form of physio-therapy, the general ultra-violet light bath, will stimulate the function of the skin and its capacity for forming antibodies. It will also increase the general tone and hasten convalescence.

The local treatment in the case of catarrhal conditions is directed towards the regeneration of the mucous membrane, damaged by repeated attacks of catarrh. This is of great importance, as the delicate cell tissue of the mucous membrane of this whole tract is possessed of considerable bactericidal power. The Kromayer lamp is invaluable here, but it is costly, complicated, and should only be used by a skilled actinotherapeutist. The "cold quartz lamp," however, offers the general practitioner a good and simple instrument for the local treatment of nose and throat. It reaches its maximum emission in 30 seconds and remains constant, proceeding to the first degree of erythema in one-and-a-half minutes, just double the time of the Kromayer lamp. As the mucous membrane of the throat and nose is often highly sensitive to light, it is best to begin with the usual Kromayer contact dose of 20 seconds and to work this carefully and gradually up to two minutes, this dose being given every other day and then continued bi-weekly, up to the maximum effectual dose for throat and nose, which is five minutes.

ADVANCES IN TREATMENT IN OTO-LARYNGOLOGY

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WHAT makes the specialty of oto-rhino-laryngology (to which cumbrous term ought now to be added endoscopy) so fascinating to its practitioners is that so much of it is still in a state of uncertainty and that many of its most common and everyday problems still defy solution. In spite of much recent research work—in which should especially be noted the names of Wever and Bray at Princeton, Davis and his colleagues at Harvard, and Hallpike, Ashcroft and Rawdon-Smith in London—there is even now no general agreement on how we hear, far less on the etiology or treatment of deafness.[1] It might have been thought, too, that laryngologists were at least tired of, if not agreed upon, the well-worn subject of the tonsils and tonsillectomy, but in 1934 in the leading medical journals of the world no fewer than 284 articles were devoted to some aspect of the tonsils, as indexed in that invaluable quarterly reference book, the *Quarterly Cumulative Index Medicus* of the American Medical Association.

In 1933 the present writer [2] contributed to a Special Number of *The Practitioner* an article on modern methods of treatment in oto-laryngology, when the subjects reviewed comprised cancer of the œsophagus, cancer of the larynx, tuberculosis of the larynx, bronchoscopy in therapeutics, the treatment of nasal sinus suppuration, and anæsthesia in nose and throat operations. It is still difficult in any individual case of malignant disease of the throat to advise on the best method of treatment, when considering the claims of the advocates of surgical operation, diathermy, radium, and therapeutic X-rays, except that the end-results of the operation of laryngo-fissure in early cases of intrinsic cancer of the larynx are so good that that operation cannot be displaced in favour of radio-therapy. Surgeons are, however, hesitating to-day to recommend such a mutilating operation as laryngectomy as against treatment by radium or X-rays, even although extrinsic cancer of the larynx is apparently not very radio-sensitive and the end-results as regards life are not as good as those of laryngectomy. In regard to other types of malignant disease of the nose and throat, one looks hopefully to the future of radiation by massive units of radium or by deep X-rays, although the published results of three-year or five-year " cures " are still disappointing. The chief essential for successful treatment is early diagnosis, and if the diagnosis is made early the actual method of treatment employed seems to be less important.

THE CONSERVATIVE TREATMENT OF CHRONIC MIDDLE-EAR SUPPURATION

Chronic middle-ear suppuration is a somewhat elastic term which covers a number of conditions, some of grave import and others of comparatively small significance. Its treatment therefore varies in accordance with the morbid changes present; but operation—especially the radical mastoid operation—is less popular than it was. J. F. O'Malley recently pointed out that for many years, in cases of extensive middle-ear disease with granulations and suppuration, which had undergone long periods of treatment by syringing and the various antiseptic and astringent drops, he followed the usual practice of doing a radical mastoid operation. In a very large proportion of these he found only a sclerosed mastoid, with possibly a little septic debris in the antrum, but practically all the active disease present was encompassed by the boundaries of the middle ear, which could be reached through the external meatus. He came to the conclusion that, as so little was found in the mastoid itself in most of these cases, treatment of the middle ear should in suitable cases be given a good trial first before undertaking any larger surgical procedure, and in consequence he has done fewer radical mastoid operations in recent years.

A conservative method that has recently gained favour is the insufflation of so-called iodine powder, which consists of a small percentage (from 0·75 to 2 per cent.) of iodine in boracic acid powder. The iodine powder first used was an American proprietary preparation, originated by Nathan Sulzberger, a New York chemist, about 1915, and was called by him "iodosan," though the use of iodine in the treatment of middle-ear suppuration is not new. The first mention of iodine powder in the literature was in 1917, when M. D. Lederman wrote enthusiastically of the results obtained in the treatment of middle-ear suppuration by the use of a new iodine powder (Sulzberger's), the formula of which was not disclosed by its maker, but which was stated to liberate readily the iodine content. The formula was not made public until 1930, and was then stated by Lederman to be a percentage, varying from 0·75 to 10, of iodine in boracic acid powder; he insisted, however, that the best results could be obtained only with the original Sulzberger powder.

I have become convinced of the value of the insufflation of iodine 0·75 or 1 per cent. in boracic acid powder in the treatment of chronic middle-ear suppuration. The powder is not a chemical compound of iodine. It is iodine in a very finely divided condition distributed over boracic powder as a carrier. It is prepared, according to the original directions, by adding an alcoholic solution of iodine to an alcoholic solution of boracic acid; after this solution is freed of alcohol a brownish powder is obtained. The method employed by the present writer is simpler, less expensive and apparently equally effective: the appropriate quantity of resublimed iodine (according to the percentage) is broken down with a few drops of spiritus vini rectificatus, and the fine boracic powder gradually added. The ear must first be thoroughly cleansed by dry mopping; sometimes debris has to be syringed out and then the ear is dried by mops dipped in ether. The middle ear is cleared by being inflated by means of the Eustachian catheter and any pus that comes through the perforation is again removed by mopping. The powder is then blown by an insufflator through the perforation into the middle ear and until the deepest part of the meatus is filled with it. Nascent iodine apparently gets into the furthest corners of the affected middle ear. I have found in the past three years that 90 per cent. of cases of chronic middle-ear suppuration—with healthy noses and throats—have been cleared up by this method carefully applied. Sufficient time has not elapsed to use the word cure, and there have been a number of recurrences, which have again cleared up after further treatment. So far, no intracranial complications have been known to have developed.

AGRANULOCYTIC ANGINA

Although agranulocytic angina is really a disease of the hæmatopoietic system with a characteristic blood picture, it is nevertheless an important disease from the point of view of the laryngologist, since the first signs may present themselves in the mouth and fauces, and unless a correct diagnosis is made at an early stage, the outcome is almost invariably fatal. By the time local lesions in the fauces are present, diagnosis by means of a blood-count is possible. While it is hardly practicable to insist on the performance of a blood-count in every case of acute sore throat, yet in such a case presenting severe prostration with ulceration of the mouth or fauces, examination of the blood, or at least of a blood film, should certainly be carried out to exclude the possibility of agranulocytic angina. There is no other throat condition which will produce the characteristic blood picture of the disease. Such local conditions as Vincent's angina, acute follicular tonsillitis and diphtheria, which may at times present confusing lesions in the throat, do not give rise to leucopenia but rather to leucocytosis.

Direct treatment of the blood condition is essential if life is to be saved. Local treatment of the oro-pharyngeal lesions consists mainly in spraying or douching with hydrogen peroxide or potassium chlorate. Usually, in patients who respond to treatment of the blood condition, a striking and rapid recovery of the local lesions occurs, irrespective of local treatment. Reznikoff, in 1928 and 1930, made the first clinical application of nucleotide therapy in agranulocytosis, and in 1932 H. Jackson, Parker and Taylor investigated 69 cases, of which 74 per cent. recovered after treatment, with a mixture of the sodium salts of pentose nucleotide —known under the trade name of "pentnucleotide." This series achieved the lowest mortality of any group of cases of similar size. Pentnucleotide apparently acts as a direct stimulant to the bone marrow. Reznikoff has recently used adenine sulphate in 15 cases, with 11 recoveries. One gramme of adenine sulphate is dissolved by boiling for two or three minutes in 30 to 40 c.cm. of normal saline solution, allowed to cool slightly, filtered into a syringe through a small adapter containing cotton, to keep out all undissolved crystals, and injected intravenously while still warm (about 105° to 110° F.). This dose is to be used three times a day for at least three days. It is non-toxic, gives no disagreeable reactions, and may be used in the presence of myocardial disease. (H. Jackson and his co-workers warn against the use of pentose nucleotide in patients with myocardial disease.) Complete solution of the drug may be accomplished, when difficult, by adding a drop or two of dilute hydrochloric acid or increasing the amount of normal saline to 50 c.cm. In this country J. F. Wilkinson[3] in particular has advocated intensive treatment by pentnucleotide. He injects 20 c.cm. intramuscularly once or twice daily for two to three days, thereafter reducing the dose to 10 c.cm. once or twice daily until the white cell begins to rise, as it usually does on the fifth day of treatment. The dose can then be reduced to 10 c.cm. once daily for a few days.

MENIÈRE'S DISEASE

Menière's disease consists essentially—although the name is often loosely applied to similar conditions—in attacks of severe giddiness, with nausea and vomiting, almost always tinnitus, always a certain degree of deafness in one ear. Of 100 cases of vertigo reported recently, E. D. D. Davis considered only 19 due to Menière's disease; 15 were due to chronic middle-ear suppuration, 18 to healed suppuration (secondary sclerosis), 15 to otosclerosis, and the others to various causes, such as acute otitis media and disseminated sclerosis. Although it is by no means a rare condition and has been studied by many observers from Menière onwards, the pathology of Menière's disease is still a matter of conjecture and some authorities have doubted whether it is a distinct pathological entity at all.

Dida Dederding and Mygind, of Copenhagen, supported in England by Thacker Neville, state that the symptoms of Menière's disease are due to increase of pressure in the semicircular canals, which produces vertigo and deafness by displacement of the stapes. They attribute this increased pressure to a faulty water metabolism which allows water to collect intracellularly, resulting in subcutaneous infiltrations, overloading of the fluid in the labyrinth, and increase of pressure in the cerebrospinal fluid. Their treatment of Menière's disease, based on this theory, consists in diminishing the intake of fluid so that the patient loses weight and is actually thirsty. For dietetic purposes fruit and vegetables are considered to be fluid. The loss of water must also be promoted by baths, by exposure to the carbon-arc lamp up to one hour three times a week, and by massage. Diet must be salt-free.

W. E. Dandy insists that Menière's disease can be permanently cured by surgical methods, with practically no risk to life or function. In a series of 42 cases in which he has operated since 1927 there was no death, no complications except that in two early cases the facial nerve was injured, and in no case has there been a single attack of vertigo subsequent to the operation. Dandy prefers to operate under avertin anæsthesia and approaches the auditory nerve from the back of the skull. Division—total or partial, of the vestibular branch only—of the auditory nerve is made by a small tenotomy knife or tiny scissors, carefully avoiding the internal auditory artery or any small branches. After operation there may be transient Bell's palsy, diplopia, nystagmus, or vertigo, but in all Dandy's cases these phenomena passed off within a few days. Cairns and Brain have reported four cases in which this operation was performed, with excellent results.

W. M. Mollison injects absolute alcohol through an opening in the external semicircular canal, with success in 22 out of 28 cases. In America a fine diathermy needle is being employed successfully in place of alcohol injections. E. D. D. Davis has performed superior and inferior vestibulotomy in 6 cases for aural vertigo, with satisfactory results; all had had a previous radical mastoid operation. The good effects of these procedures rather invalidate the conclusions of Dandy that the lesion is in the auditory nerve. In persistent, severe cases which do not react to medical treatment — especially luminal and bulbocapnine — section of the auditory nerve or operation on the labyrinth may be indicated, but only, of course, when the diagnosis is certain that the vertigo arises from the internal ear.

CHRONIC NASAL SINUSITIS AND ITS TREATMENT

There is probably no subject in the whole range of laryngology and rhinology on which there is less unanimity of opinion than there is on the treatment of chronic nasal sinusitis. A good deal depends, indeed, on the mental attitude of the rhinologist, for in this, as in other spheres, there are convinced " conservatives " and equally convinced " radicals." A thorough study must be made of the individual patient before a decision as to treatment is made, and it is best to use, in the words of Proetz, conservative treatment when possible and radical treatment when necessary; but what may be considered a radical procedure for one patient may be considered conservative for another.

While cases of long-standing sinus suppuration require operation, more recent cases may clear up by employing conservative measures. Repeated puncture and lavage will often clear up maxillary sinusitis, but it is impossible to introduce any medicament into the other nasal sinuses by means of sprays or douches, and here a considerable advance has been made by using the displacement method of Proetz, by which any fluid can be introduced into the sinuses with ease, provided the ostia are patent. This method has already been described in *The Practitioner* by the present writer.[2]

As regards surgical measures, there is considerable difference of opinion as to whether to remove the mucous membrane lining the sinuses or how much of it to conserve. In performing intranasal antrum operations most surgeons leave the mucous membrane, just as in performing the Caldwell-Luc and other radical operations most surgeons meticulously remove all the mucous membrane from the walls of the antrum. As regards the mucous membrane of the frontal, ethmoidal and sphenoidal sinuses, in England most surgeons conserve it unless it is grossly pathological. In America, Ferris Smith carefully removes every vestige of mucous membrane and leaves the bone scrupulously clean, clearing away even any adherent shreds.

Draining the antrum through the inferior meatus may cause such a marked change in the appearance of the mucous membrane of the middle meatus in a very few days that the necessity of exploring the ethmoid cells may be obviated. Sometimes a high removal of the middle turbinal or correction of a high deviation of the nasal septum will facilitate fronto-ethmoidal drainage. The key to fronto-ethmoidal suppuration is, however, frequently—though not always—the maxillary sinus.

Ferris Smith says that much attention has been directed to intranasal methods, with the development of excellent technique for the satisfactory management of many subacute or early chronic conditions which require only adequate drainage for their resolution. It is not for these cases that he advises an external radical operation, but rather for those cases which have resisted sufficient intelligently applied intranasal treatment to effect a cure and whose pathological changes are of such a nature and so advanced that no type of management can effect their return to normal. No operator, however skilful, can, by using " conservative radical " intranasal methods, enter all of the ethmoid cells in many cases, nor would be so bold as to claim more than increased drainage in a frontal sinus. There can be no two opinions about the brilliance of the technique of Sewall and Ferris Smith, but whether such a radical external operation, with complete removal of the mucous membrane, is necessary in so many cases—Ferris Smith has, for example, a series of over 500—is another matter. If it be restricted to cases in which "intelligently applied intranasal treatment" has failed to effect a cure, then undoubtedly it marks a considerable advance.

SURGICAL TREATMENT OF FACIAL PARALYSIS

Experiments in 1930 onwards by Sir Charles Ballance and Arthur B. Duel have led to the method of introducing a piece of freshly excised graft from another nerve into the gap left by the removal of the injured portion of the facial nerve in the Fallopian aqueduct. The results of these experiments have proved the new method to be far superior to those previously employed in regard to the rate of recovery of the paralysed muscles and to the absence of associated movements. In cases of slight injury to the sheath of the facial nerve, or when paralysis occurs either during the course of acute or chronic otitis media or due to an inflammatory process as in Bell's palsy, it is sufficient to expose the nerve in the Fallopian aqueduct for a length of 4 or 5 mm. above and below the site of injury or disease, and to decompress the nerve by incising its sheath. This surgical treatment has not yet been generally adopted for cases of Bell's palsy which show little or no recovery within a period of months, for those who first see and treat cases of Bell's palsy are loth to subject them to such a radical procedure as that of uncovering the nerve and incising the sheath, in the expectation that recovery will take place in due course without treatment. There seems little doubt, however, that in the future this operation will be resorted to more frequently as a result of the advocacy of Ballance and Duel, to obviate the marked deformity which results in protracted cases.

When Ballance and Duel first started using nerve grafts they under-estimated the extent of the gap which would have to be filled by the fresh graft. A surprising length of nerve had to be employed, and for this reason the anterior femoral cutaneous nerve was finally selected for the fresh graft, as this would give sufficient lengths even up to 100 mm. if required. The complete or radical mastoid operation should be performed before removal of the outer wall of the aqueduct is begun. Duel uncovers the nerve by removal of the outer wall of the aqueduct, working from the stylomastoid foramen upward. Successful transplantation of grafts results in a subsequent response to faradic stimulation in previously paralysed muscles and then in spontaneous movements. But although this method of nerve grafting constituted a real advance on all previous methods of dealing surgically with facial palsy, Duel found that the period of waiting for recovery was often prolonged and tedious, even though eventually the results were functionally good. He then evolved the technique of using degenerated nerve grafts instead of fresh nerve grafts.

Duel says that operation is justified in any case of long standing in which there is sufficient galvanic response in the muscles to show that they have not undergone too much fibrous atrophy. The nerve can always be repaired. Transplantation of grafts is a matter of technique, no matter what the length of graft required, and no case should be left with a deformity if there is sufficient muscle fibre left to warrant operation. Of the 69 operated cases of facial paralysis reported in Duel's series in four years, 40 have required grafts in the Fallopian canal; the average length of the gap in these 40 cases was over 20 mm. in length, the shortest being 7 mm. and the longest 40 mm.

References

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[2] *Idem.: The Practitioner*, 1933, cxxxi, 484.

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ADVANCES IN TREATMENT OF EYE DISEASES

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THE purpose of this article is to convey in a limited space some of the more important features concerning the application of certain therapeutic agents employed in general medicine and surgery to the treatment of diseases of the eye. Other therapeutic practices of current interest and special concern to the ophthalmologist, such as orthoptic training in cases of strabismus, corneal contact glasses and corneal grafting have also received attention.

RADIUM

Clinical experiences supported by pathological investigations whenever material became available have proved that radiotherapy is of value in certain ophthalmic disorders. Owing to the limited number of cases in which the application of radium is indicated and justifiable and to our present lack of knowledge about its optimum dosage, the methods of application and the amount of radium used in these cases have of necessity been empirical.

Intra-ocular neoplasms.—Foster Moore has done pioneer work in the treatment of intra-ocular neoplasms either by the insertion of a radon seed through the sclera into the neoplasm or by suturing seeds to the sclera over the site of the growth. Glioma retinæ, sarcoma of the choroid and angiomatosis retinæ are radiosensitive and have been treated by one of those methods. The results have been quite encouraging and much has been learned from varying the technique and dosage. Recent experiences have favoured the use of radon seeds of 2 mc. or less sutured to the sclera at the desired sites.

Radium treatment is justifiable in cases in which an intra-ocular neoplasm affects the remaining eye, the other having been excised for a glioma retinæ or other reason, in which there remains some healthy retina capable of useful function.

Epibulbar neoplasms.—Malignant melanomas and carcinomas at the corneo-scleral junction respond satisfactorily to radiotherapy when the neoplasm is well localized, has not penetrated the globe and has not spread extensively around the limbus and over the cornea. In the treatment of these cases the Radium Institute employs a circular or rectangular applicator made of monel metal. 5, 7 or 10 mgm. of radium salt is placed in a shallow trough on one surface of the applicator and retained in place with varnish. The applicator is applied directly to the neoplasm and the unscreened β rays thus employed. Treatment is given for 50 to 60 minutes and repeated if necessary at intervals of two months. The results are good.

Vernal conjunctivitis (*Spring catarrh*).—Radiotherapy has been tried in the treatment of an intractable type of chronic conjunctivitis which recurs in the early summer and is characterized by the formation of pavingstone-like plaques of chronic inflammatory tissue and cells affecting particularly the palpebral conjunctiva of the upper lids and more rarely the bulbar conjunctiva.

On account of the seasonal recrudescence and abatement of this disease and its natural tendency to disappear after a number of years it is difficult to assess fairly the value of radium in its treatment. A few cases have been dramatically cured by radiotherapy during the first few months of the disease, but the majority, although improved by radium, recur. Some prophylactic benefit appears to come from irradiation of the affected areas at monthly intervals during February, March and April, the months before the usual recurrence. If not cured many patients are relieved; only a few are unimproved or made worse.

Orbital neoplasms.—Radium has been used in and around the orbit in cases of certain primary malignant neoplasms arising in its contents or its walls and also in cases where extra-ocular extension of a malignant intra-ocular neoplasm is present, or feared, after excision of the eye.

In the present state of our knowledge, radiotherapy for diseases of the eye and its adnexa should not be undertaken lightly. The dangers are not a few; irradiation cataract, chronic conjunctivitis, corneal necrosis, panophthalmitis, necrosis of bone, failure to destroy the whole neoplasm and even stimulation of its rate of growth are among the grosser disasters attendant upon this mode of therapy. Added to this there is the ever present danger of damage to the operator whose hands, blood and general well-being may be affected, and it seems unjustifiable thus to jeopardize the full-time radium worker by imposing upon him the responsibility of treating cases of inflammatory disease in which the beneficial effects of radium are doubtful. In malignant neoplasms the case is different and no effort should be spared to save the patient from blindness and even death.

DIATHERMY

(1) *Medical diathermy.*—A number of pathological conditions of the eyes have been treated by medical diathermy. Of these glaucoma, post-operative intra-ocular infections and orbital cellulitis have shown more convincing results than in the case of other diseases such as retro-bulbar neuritis, vitreous opacities, interstitial keratitis and chronic iridocyclitis in which improvement occurs in spite of any treatment, thus making it difficult to assess fairly the value of diathermy. *Glaucoma:* In the treatment of acute or subacute

glaucoma the results from diathermy are very pleasing. Pain is relieved at once and the tension reduced to a degree that renders operative measures relatively safe. Diathermy accelerates the action of eserine in its miotic effect. The relief of pain is quite remarkable. One patient who had suffered many hours of severe pain, insomnia and vomiting fell asleep during the diathermy treatment. *Retro-bulbar neuritis* tends to recover to some extent satisfactorily in most cases in spite of any treatment. Law is of the opinion that diathermy renders this recovery more rapid and complete. *Chronic iridocyclitis* receives treatment with atropine and other therapeutic agents, so that it is difficult to assess the value of diathermy in conjunction with these other measures. *Keratitis:* Law states that superficial punctate keratitis responds best to diathermy, but that this treatment is irritating in some cases. *Orbital cellulitis and post-operative intra-ocular infections* have in some instances responded well to diathermy. The neuralgic pain of herpes ophthalmicus is said to be relieved, and Manbrun and Casteran claim that diathermy benefits corneal ulcers, especially those following facial paralysis. My experience of diathermy in the treatment of secondary glaucoma due to cyclitis, anterior uveitis, and keratitis with a deep anterior chamber, is that a number of such cases do not benefit by the treatment and some are made worse. Small vitreous opacities and hæmorrhages tend to be absorbed to a varying degree by natural processes. It is doubtful whether diathermy plays a part in accelerating this process. Some cases of large vitreous hæmorrhages are unaffected by it and useful vision is not restored to the patient.

(2) *Surgical diathermy.*—This is employed in ophthalmology in the treatment of simple detachment of the retina; in the removal of neoplasms of the lid, conjunctiva and orbit; in the treatment of symblepharon

arising in a contracted socket; and for the relief of trichiasis. *Detachment of the retina*: The fundamental principles in the treatment of simple retinal detachment are briefly as follows: Localization of the site of a retinal tear or hole and the effective closure of this by exciting a choroido-retinitis in its vicinity and draining the inter-retinal (sub-retinal) fluid during the period when adhesions are forming. Before operation a careful search for a retinal tear or hole is made and its meridional position estimated in terms of the hands of the clock, its distance from the ora serrata being calculated in optic disc diameters (the approximate diameter of the optic disc being regarded as 1·5 mm.). Retinal holes may be single or multiple; situated in the detached portion of the retina or remote from it; their shape may be round, arrow-headed and slit-like. Large irregular rents and extensive tears at the ora serrata (anterior retinal dialysis) are sometimes seen. Surgical diathermy is used to excite a localized choroiditis over the site and in the vicinity of the retinal tear and detachment. Beneath the points of application to the sclera lymphocytes, plasma cells and fibroblasts appear in the underlying choroid and small buds of granulation tissue herniate through Bruch's membrane grappling the retina to the choroid and ultimately being replaced by fibrous tissue, thus making a secure choroido-retinal adhesion. Three methods of achieving this object are practised: (1) Surface diathermy (Larsson); Micro-punctures to close the retinal hole (Weve); (3) Simultaneous multiple punctures (Safar).

The results of treatment of retinal detachment by these methods are better than those of any other procedure. A number of patients have been treated by Larsson's surface diathermy technique and of these 43 to 58 per cent. have been cured. It is possible that after a lapse of some years, during which time recurrences of the retinal detachment may happen, that these statistics will prove to be too optimistic. Of the other methods of applying surgical diathermy too few cases have so far been treated to afford any reliable statistics.

Electro-desiccation : Small neoplasms on the lid margin, the limbus, the plica semilunaris and caruncle may be satisfactorily treated by electro-desiccation, a method in which a large indifferent electrode is used and a small needle as the active electrode. A current of 200–300 milliampères for two or three seconds is employed. This method can also be used to form a "barrage" through the normal tissues beyond a neoplasm previous to its excision. *Electrode knife :* The excision of large malignant neoplasms and exenteration of the orbit may be effected by the electrode knife. The indifferent electrode is replaced by a branched handle carrying two small electrodes set a short distance apart. An intense heat is generated in the zone between these two electrodes. A current of 500 milliampères is used. *Cicatricial bands* in a socket after excision of an eye may be effectively divided by a needle hook composed of two electrodes. A current of 100–300 milliampères is passed for two or three seconds, sufficient to turn the cicatricial band white. A temporary prosthesis is inserted immediately. The effect is permanent after 15 days and the resultant scars are delicate and non-retractile. *Trichiasis* is treated by passing a sharp needle into a lash follicle and using a current of 150 milliamps for one second. It is considerably less painful than electrolysis. *Cataract extraction :* Recently Lacarrère and others have attempted intra-capsular cataract extraction by introducing a needle into the substance of the lens after the Graefe section has been made, thereby producing electro-coagulation of the adjacent lens fibres. Subsequent manipulations to effect rupture of the suspensory ligament and extraction of the lens in its capsule depend upon the adhesion of the lens to the needle. The lift on the lens by this method is said to be equivalent to 70 grams, which is considerably more than can be obtained by capsule forceps or Barraquer's suction apparatus.

X-RAYS

X-rays in therapeutic doses have no effect on the fully developed retina and optic nerve. In clinical work any ocular damage that follows X-ray irradiation, with the exception of lens changes, is in most cases the result of an overdose or large doses used in the treatment of lupus or carcinoma of the lids. There are, however, individual variations in susceptibility of the ocular tissues to damage. Irradiation cataract is characterized by its onset nine months to eight years after X-ray treatment to the eye or its adnexa; this is particularly so in cases of malignant neoplasm of the orbit, the nose or base of the skull in which it is unavoidable that some of the rays scatter and penetrate the eye. The lens changes consist of a dense plaque and some fine powdery opacities in the posterior cortex close to the posterior capsule.

Some good is effected in cases of acne rosacea keratitis by administering $\frac{1}{3}$ to $\frac{1}{6}$ Sabouraud's pastille dose using a Coolidge tube, the cathode being at 23 cm. focal distance from the cornea, and 1 mm. aluminium filter. The spark gap recommended is 11 inches and the rays pass to the eye through a lead glass applicator $1\frac{1}{2}$ to 2 mm. in diameter. Greeves reports satisfactory results from this treatment, the patients receiving much subjective relief and some being free from recurrences or having the number and severity of these reduced. Treatment may be repeated three or four times at fortnightly intervals.

Benefit from X-ray therapy is also reported in cases of recurrent corneal erosion, superficial punctate keratitis, and tuberculous lesions of the cornea and conjunctiva. A few cases of malignant intra-ocular neoplasms shrank temporarily but active growth recurred locally later. The results in the treatment of iritis, iridocyclitis, glaucoma and vitreous hæmorrhages are not convincing. Trachoma and spring catarrh cases are alleged to be benefited. Blepharitis of a sycotic character with pustules around the lash follicles and very resistant to treatment is improved by two or three X-ray treatments exposing the lid margins to 3 milliampères, with 6-inch spark gap at 8 inches distance for 40 to 60 seconds repeated at weekly intervals. The rest of the lids is protected by lead foil. This is $\frac{1}{5}$ to $\frac{1}{2}$ of the epilation dose and is also effective for cases of chronic dermatitis of the lids. Multiple lymphoma of the lids and orbit do well with X-ray treatment. Deep X-ray therapy of the orbital tissue is indicated in cases where pathological examination of an eye excised for a malignant neoplasm has revealed an extra-ocular extension of malignant cells.

ULTRA-VIOLET LIGHT

The local application of ultra-violet light to certain superficial diseases of the eye, such as corneal ulcers, superficial keratitis, neuro-paralytic keratitis, phlyctenular keratitis, recurrent corneal abrasion and conjunctivitis has a beneficial effect in expediting healing of these lesions. Local ultra-violet light has also been of value in rendering the conjunctiva free of pathogenic micro-organisms prior to cataract extraction in cases where antiseptic irrigations and other methods have proved of no avail.

The apparatus used consists of a mercury-vapour lamp running at 2 ampères and a quartz optical system for concentrating the energy given out from the lamp. The size of the beam may be adjusted by an iris diaphragm and by moving the position of the projector quartz lens. The area irradiated when the beam is sharply focused may be varied from 1 mm. to 3·25 mm. in diameter. The initial dose is from 1 to $2\frac{1}{2}$ minutes and suitable modifications in the dose have to be adjusted if the beam is directed obliquely, approximately one and a half times the dose for an angle of 45° and twice for an angle of 60°. In successive sessions the dose in increased up to 4 minutes.

General phototherapy has been found a useful adjunct in the treatment of blepharitis, phlyctenular disease and conjunctivitis in children. At the Moorfields Eye Hospital treatments are given thrice weekly for a course of 18 exposures. The exposures are graduated as regards time and the area of skin irradiated. The mercury-vapour lamp at 2 feet range is used for nine treatments and the carbon arc lamp at 4 feet for the remaining nine exposures.

CONTACT GLASSES

It is only recently that the technical difficulties in the manufacture of corneal contact glasses have been solved in a manner that has made possible the practical application of these glasses in selected cases of refractive errors. These glasses are of some value in cases of conical cornea, high degrees of astigmatism and other corneal irregularities which cannot be corrected to any advantage by ordinary glasses, certain diseases of the cornea, and as an aid to corneal surgery for the retention of corneal and mucous membrane grafts in high myopia and unilateral aphakia. Contact glasses have been used for protective purposes in lagophthalmos, neuro-paralytic keratitis, entropion and dystrichiasis.

The Zeiss glasses have two parts, a spherical corneal portion with a diameter of approximately 12 mm. and a vertex thickness of 0·5 mm. surrounded by a peripheral scleral rim 20 mm. in diameter, 0·3 mm. thick at the edge. The corneal portion is separated from the cornea by an applied meniscus of normal physiological saline, the scleral rim fitting snugly on the sclera. With the glass in position the refraction of the irregular air-corneal interface is abolished by having on its outer side a fluid with the same refractive index as the aqueous covered by a regular air-glass interface, so that excluding opacities in the media the only optical irregularities which remain are small astigmatic defects of the lens.

The fitting of the Zeiss contact glass is by trial and error. The radii of the inner scleral curvatures are 11, 12 and 13 mm., and 0·5 mm. subdivisions are available. A close scleral and limbal fit has been held to be desirable. If the fit at the limbus is inaccurate the rim will rub the eye and irritate it. The fitting may be examined by the corneal loupe or the slit-lamp. In recent years the corneal and scleral curvatures have been estimated by taking a mould of the anterior surface of the eye and from this mould preparing a contact glass in which the necessary optical correction is ground in the centre of the corneal portion corresponding with the pupillary aperture. This central area rests upon the cornea and appears not to damage it. In manufacturing the glass it is lifted clear of the limbus for a short distance around the entire circumference but fits snugly to the sclera elsewhere. This procedure has been introduced because it has been thought by some authorities that pressure at the limbus causes irritation of the eye and corneal œdema from interference with the limbal vascular supply. The advantages of these glasses are the visual improvement they effect; the power of binocular and stereoscopic vision that they afford in cases where one eye is aphakic and the other normal; they are maintained at body temperature and so do not become steamed over in heat or affected by rain and mist, a disadvantage of spectacles; and a high myope is enabled to see with contact glasses while bathing.

The disadvantages are the difficulties which the patient experiences in manipulating the glass into place, although this has recently been obviated to some extent by improved mechanical devices for the purpose, and the fact that some patients are quite unable to tolerate the pressure of the glasses. Irritability provoked by limbal pressure and rubbing can be corrected by alterations in the fitting of the glasses. In cases of mild conjunctivitis and inflammatory lesions of the anterior part of the eye the glasses augment the irritation and symptoms of the disease. Intolerance in some cases has a psychological foundation. The glasses are expensive, each glass costing approximately £4; they are very delicate and easily broken.

The dangers as regards breakage into the eye are not great and if this accident should occur it is unlikely that fragments of glass would perforate the globe. Rugg-Gunn draws an analogy between breaking a thin cover glass in the palm of the hand, when the skin escapes injury, whereas if the cover glass is fixed and broken an inch away from the hand some of the fragments will probably be driven into the skin.

CORNEAL GRAFTING (KERATOPLASTY)

In recent years there has been a revival of interest in corneal grafting and experimental work on living animals has taught us several important technical facts. From these experiments and the work performed on human eyes it seems that up to date penetrating circumscribed keratoplasty using a transplant from the same species is the method of choice. Although theoretically autoplasty should give better results it is generally inapplicable, for where an area of clear cornea exists an optical iridectomy may be performed and rarely does it happen that the other eye is blind and possesses a transparent cornea.

It is desirable, but not essential, that the donor and recipient should be of the same blood group as regards hæmolysis and agglutination of serum. The donor's cornea must be normal and free from involvement in any active disease of the anterior part of the eye such as iritis and sarcoma invading the filtration angle. Chronic disease of the donor's eye behind the iris diaphragm is not a contra-indication to obtaining a corneal graft. The eyes of young persons are more suitable than old, and although a graft may be taken from a cadaver immediately after death a living donor is preferable.

It is regrettable that in spite of an initial improvement in a number of cases the graft becomes opaque in the course of several months. From the Continent the best visual results are reported in cases of interstitial keratitis. Few cases are enabled to see better than 6/60, but that they receive the means whereby to see their way about makes this work encouraging. Recently a number of technical modifications in corneal grafting have been used but at present owing to the very small number of cases in which this operation is indicated it is too early to assess the relative value of these procedures.

CATARACT

Up to date no therapeutic agent has been found which will make opaque lens fibres transparent. In cataract the change in the lens proteins is irreversible. A number of agents have been tried without any convincing success and the assessment of their value is rendered more difficult by the fact that some 90 per cent. of persons over 60 years of age have peripheral opacities in the lens cortex and approximately 90 per cent. of these never progress to a degree where vision is spoiled.

Radium and ultra-violet light have been recommended in the treatment of immature cataract, but both these therapeutic agents are themselves capable of producing lens opacities. Massage and electricity have also been advocated but may have a deleterious traumatic effect on the lens. Iodine in a number of forms has been tried without conspicuous success and recently Siegrist has advanced claims in favour of a calcium and glandular preparation, paraphakin, which contains extracts of thyroid, parathyroid, testis and calcium lactate. The dosage recommended is one tablet thrice daily at meals for 25 days, then an interval of 25 days and repeat. If a serious cardiac disorder is present the tablets should be taken for eight days followed by an interval of eight days. Careful attention to focal sepsis, medical attention to the portals of elimination and appropriate diet in cases of diabetes and errors of metabolism are helpful.

Visual assistance may be afforded to patients suffering from immature cataract by wearing out of doors kryptok glasses, which are tinted in such a manner that the periphery is denser than the centre. The amount of light entering the eye from various angles and mistiness caused by the refraction of this by the lens opacities are reduced. In some cases of nuclear and central lens opacities the wearing of dark glasses (Crookes B2 or dark amber) allows the pupil to dilate to a degree necessary for the utilization of the clear lens matter at the periphery. On the same principle of reducing the light entering the eye from the periphery the wearing of vizards or tubular glasses has enabled some patients with immature cataract to read better. When the vision becomes seriously defective, less than 6/18 is a rough standard, there is no satisfactory treatment other than surgical removal of the lens.

STRABISMUS

Recent revival of " fusion " (orthoptic) training has afforded an added stimulus to the controversy about the non-operative and operative treatment of strabismus. There is at the present time a great need for the formulation of some clear-cut conceptions as to the guiding principles in its treatment, chiefly in regard to those cases which will profit by orthoptic training and those which will not, and concerning the indication and the optimum age for operation. Instrumental improvements such as are embodied in the synoptophore and the orthoptoscope have led to a better understanding of some of the difficulties met with in orthoptic training, particularly in cases of abnormal retinal correspondence, and have enabled the orthoptic trainer to keep the patient's eyes under close observation, an important feature which was impossible with Worth's amblyoscope.

The fact that amblyopia develops before seven years of age and never after this, that it has a greater depth in long-standing cases and in those which have received inadequate treatment, makes it imperative that cases of strabismus should receive prompt and proper treatment. The earlier the onset of squint and the longer the lapse of time before treatment is begun, the longer will have to be the period of occlusion of the fixing eye before amblyopia (if this be present) will be broken down. During the period of occlusion repeated examination must be made of the occluded eye to ascertain that it does not become amblyopic and later, when occlusion is omitted, of the originally amblyopic eye to detect any tendency to relapse.

Orthoptic training is rarely of use in cases in which the vision of the squinting eye is less than 6/12, though there are exceptions when stereoscopic vision has been developed with a visual acuity of 6/24. My impression is that the best results from orthoptic training are in children who are intelligent and co-operative, in whom the angle of squint is 10° or less, the squint of short duration, where normal retinal correspondence is present, and fusion is obtained within 6 lessons of 20 minutes duration. It is probable that some degree of fusion is present in the majority of these cases when orthoptic training is begun.

In patients in whom the angle of squint is over 20° and has been of long standing with amblyopia of some duration, when abnormal retinal correspondence is present and the patient is dull and unhelpful, the time and labour devoted to training seems quite unjustified by the meagre results. Travers states that 77–87 per cent. of cases of abnormal retinal correspondence fail to improve by orthoptic training.

If the angle of squint is 20° or over, orthoptic training alone is of little value, and treatment other than including operative measures has no effect on cases of abnormal retinal correspondence particularly when this is of long standing. The longer the deviation persists the less likely is normal retinal correspondence to become re-established and so the earlier operation is performed the better the chances of developing fusion and stereoscopic vision. Much argument has centred round the optimum age for operation. In the light of facts revealed during the course of orthoptic training the case for early operation between the ages of 3 and 6 years seems a good one on rational grounds when the angle of squint is 20° or over. The child is at once put at better advantage to overcome amblyopia and develop normal retinal correspondence, fusion and stereoscopic vision. His training is shortened very considerably and the matter is well in hand before he goes to school. At school he escapes the ridicule and torment that is not infrequently meted out to a squinting child and is in many instances free from the irksome duties of performing daily stereoscopic exercises.

The objections levelled against early operation are the necessity for using a general anæsthetic and the difficulty of assessing the amount to do with relaxed muscles; the fact that some squints become corrected as puberty and adolescence are approached; and that in some instances a squinting eye that is rectified in childhood may diverge later. General anæsthesia does not impair the efficiency of the operation in the hands of an experienced surgeon. The number of cases of squint that undergo spontaneous correction at puberty or adolescence is relatively too few to gamble on this happy event, and it must be exceedingly rare in patients in whom the angle of squint is over 20°. In the literature I have not found any carefully prepared statistics about such cases. The number of cases in which divergence supervenes as a late event after surgical correction are rare compared with those which remain satisfactory, and timidity on this ground seems unjustifiable in the face of the bugbears of amblyopia, defective fusion, protracted training, persecution and ridicule from school-fellows.

In the opinion of many ophthalmic surgeons free tenotomy of the internal rectus muscle for concomitant convergent strabismus is bad. The amount that the divided muscle recedes is always uncertain. Blood clot may prevent its attachment to the globe, it may recede behind the equator or become adherent to the caruncle or plica semilunaris. Weak convergence and hyperphoria are other unpleasant sequelæ. Recession is a more precise procedure. It is inadvisable to recess the internal rectus muscle more than 5 mm. on account of the risk of producing defective convergence, and indeed recession should not be undertaken if this is evident before operation. When the angle of squint is more than 20°, resection or advancement of the external rectus is necessary in addition to recession of the internal rectus. The technical details of these operations vary with different surgeons.

LOCAL ANÆSTHESIA

A few recent developments in the production of local anæsthetic agents have had some practical value in ophthalmic surgery. Pantocaine ($C_{15}\ H_{24}\ N_2\ O_2\ HCl$) is readily soluble in water, does not change when frequently boiled, and combines well with adrenaline. It is used in ½ to 1 per cent. solutions, and on instillation into the conjunctival sac it produces anæsthesia of the conjunctiva and cornea in one to three minutes. Its advantages are that it has no damaging effect on the corneal epithelium and in this respect it is superior to cocaine; in cases of corneal ulceration, corneal abrasion and after tattooing operations there is said to be quicker regeneration of the corneal epithelium than is the case when cocaine is used; the pupil is unaffected and the intra-ocular pressure is not raised; no sense of instrumental pressure is felt during an operative procedure, and on this account pantocaine is particularly useful in tonometry.

For eight to fifteen seconds after instillation a burning sensation is experienced and blepharospasm is evident. The slight conjunctival hyperæmia disappears in three to five minutes. It is useful as a preliminary to applying silver nitrate and copper sulphate to the palpebral conjunctiva. For intra-ocular surgery it is not so good as cocaine in checking capillary oozing. Pantocaine may also be used for infiltration purposes. Novutox 5 per cent. possesses bactericidal properties. It combines well with adrenaline, remains sterile even after the bottle is opened, and is of particular value as a local anæsthetic in septic conditions such as dacryocystitis, hordeola, and lid abscesses. After its use the tissues heal satisfactorily.

The safety of intra-ocular operations on nervous patients is considerably greater after temporary paralysis of the orbicularis palpebrarum muscle has been induced by barrage of the upper branches of the facial nerve with 2 c.cm. of novocaine 2 per cent. as they cross the neck of the mandible. The pain liable to occur on seizing the iris in performing iridectomy may be abolished by a successful injection of 1 c.cm. of novocaine 2 per cent. into Tenon's capsule. The excision of an eye may be effected by injecting the apex of the orbital cone with 4 c.cm. of novocaine. Retro-ocular injections of novocaine into the region of the ciliary ganglion are not without risk. The intra-ocular pressure is immediately lowered by this procedure, and in certain operations, particularly cataract extraction, this renders the technique of making a corneo-scleral section more difficult. Orbital hæmorrhage causing proptosis and necessitating the abandonment of the operation is an unpleasant complication in cases such as acute glaucoma in which iridectomy is an immediate necessity.

NEW ANÆSTHETIC AGENTS AND METHODS

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IN common with other branches of medicine, the practice of anæsthesia has enjoyed certain important developments during the past two years. Many improvements in methods have been described but, in particular, the introduction of new anæsthetic agents, which has been a conspicuous feature of the past decade, has continued, and three important drugs, cyclopropane, divinyl ether, and sodium evipan, have recently been placed before the anæsthetist. Two of these are volatile substances which are administered by inhalation, while the third is a compound of barbituric acid intended for intravenous injection. All three, however, are capable of rapidly producing deep anæsthesia which is succeeded by a short recovery period; indeed, they may be regarded as securing the type of anæsthesia usually associated with chloroform with the facility usually experienced with nitrous oxide. Furthermore, the quick recovery period renders them of particular service for those operations which, although of short duration, require an adequate degree of muscular relaxation.

Although these drugs may, perhaps, be regarded as representing progress in the search for an anæsthetic which combines the maximum of safety with the minimum of both psychic and physical disturbance for the patient, it is, in general, still too early to assess their positions as anæsthetics. It is therefore the purpose of the following survey solely to review briefly the literature concerning both them and other recent developments in anæsthesia.

NITROUS OXIDE

Two recent developments in the method of administering nitrous oxide are of considerable interest. These are: (1) The introduction of suitable apparatus for the employment of this gas in a closed circuit with carbon-dioxide absorption. The method is not peculiar to nitrous oxide, but can be used for ethylene, cyclopropane and, indeed, any volatile anæsthetic. (2) The introduction of Minnitt's gas-air apparatus for the production of analgesia in midwifery.

The carbon-dioxide absorption technique of administering volatile anæsthetic agents possesses certain advantages over the intermittent and continuous-flow methods usually employed and these can be summarized as follows:—

(*a*) Considerable economy results from the use of nitrous oxide and other gases, for, when once the necessary saturation point has been obtained, it is necessary to admit to the apparatus only sufficient gas to compensate for leakages which occur mainly at the union of the apparatus with the patient. A small quantity of gas is lost from the skin of the patient, and there is also a certain amount of diffusion through the rubber parts of the apparatus. (*b*) The anæsthesia is somewhat steadier and is, perhaps, easier to control than with older methods. There is less secretion of mucus in the respiratory tract and the necessity for premedication with atropine is limited; the patient is also guarded from the risk of bronchial and pulmonary infections.

Two main types of apparatus for the use of gaseous anæsthetics in this connection have been described. These are known as the single-phase and the two-phase systems. In the single phase system as developed by Primrose of Glasgow[20, 21] the apparatus is connected to the patient with the usual single length of concertina tubing, and it will be appreciated that there is a considerable dead space in the tubing. In the two-phase system, however, the patient is connected to the apparatus by two lengths of concertina tubing; one tube brings the anæsthetic mixture from the apparatus to the patient and the other conveys expired gases from the patient to the apparatus. The gases flow in the appropriate direction on account of the interposition of suitable valves, and in the two-phase system the only dead space is that in the mask itself. Certain authorities believe that the dead space should be maintained as small as possible, and they believe that with the single-phase system the percentage of carbon dioxide is liable to rise to an undesirable level. Nevertheless, excellent results have been ascribed to the latter method, and the carbon-dioxide level remains low probably because both inspired and expired air pass through the absorbing agent.

In both systems, however, expired carbon-dioxide is absorbed by soda lime; in Primrose's[20] apparatus soda lime is in aqueous solution, while in Harris's[10] and Evans's[7] two-phase machines it is in the form of granules. It is necessary to change the soda lime at intervals of usually from three to four hours; a form of soda lime, however, is marketed in which the colour changes when its capacity to absorb carbon dioxide is approaching exhaustion. As it is essential to ensure a gas-tight joint between the mask and the patient, and as this is not easily obtained by the ordinary face piece, a pharyngeal tube has been designed[20] carrying at its periphery an inflatable rubber cuff which effectually seals the tube into the pharynx. This tube is made of rubber which will withstand repeated sterilization, and it is so efficient that pressures of 30 mm. Hg can be maintained within the apparatus without leakage. When using apparatus of this type the following facts must be borne in mind:—

Before closing the circuit a sufficient length of time must be allowed to elapse in order to permit the elimination of nitrogen from the body. Also, the administration of the anæsthetic agent must be continued until anæsthesia has reached the required depth; when this has been obtained the supply of gas and ether if employed, may be cut off, but it is, of course, still necessary to supply a constant stream of oxygen adequate for the metabolic requirements of the patient. From time to time, it is necessary to admit small quantities of the anæsthetic agent in order to compensate for losses which have been incurred in the manner previously described but the depth of anæsthesia can be regulated mainly by varying the pressure of the mixture within the apparatus.

MINNITT'S GAS-AIR APPARATUS

The necessity for a simple, safe and reliable method of securing analgesia as distinct from anæsthesia in labour has led to the introduction by Minnitt of Liverpool of an apparatus utilizing gas and air. The machine, which is of the intermittent flow variety, consists of a series of valves which permit the pressure of the nitrous oxide in the bottle to be reduced so that it is suitable for intake by the patient. A device is incorporated by which the proportion of nitrous oxide and air can be varied but, once the proportion is determined, it remains constant. A length of concertina tubing and a face mask constitute the remainder of the apparatus. The mask, however, contains a finger-valve which the patient presses down during inhalation; if the patient becomes unconscious and releases her grip the valve cuts off the anæsthetic mixture and will admit air only.

For midwifery practice, this apparatus seems to bear the same relationship to nitrous oxide as the Junker inhaler possesses to chloroform in that, in each case, the apparatus can be manipulated by and is under the control of the patient. It is as nearly fool-proof as possible. It is impossible for the patient to asphyxiate herself, but cyanosis is said to occur[6] in some cases, particularly if the patient holds her breath and bears down. The proportion of nitrous oxide in the inspired mixture is about 35 per cent.[18] and 100 gallons may be regarded as the average quantity of gas used for each labour.

Nitrous oxide is of considerable value as an anæsthetic in labour for many reasons. In addition to the absence of ill-effects on the cardio-vascular system and on hepatic function it has been shown[3] not to retard uterine contractions. Indeed it is believed that the duration, strength and frequency of the pains are increased during its administration and that labour is thereby shortened. Minnitt's apparatus presents these advantages in their simplest form.

CYCLOPROPANE

Cyclopropane or trimethylene is a colourless gas possessing a sweetish odour. Its use as an anæsthetic agent was first suggested by Lucas and Henderson in 1929[15] and since then it has been the subject of considerable experimental work, mainly in the United States where it is now being employed in increasing quantities. At the Mayo Clinic in 1934, for example, cyclopropane was employed in 1·7 per cent. of cases necessitating the use of special anæsthetic agents and methods[16], while at the Wisconsin General Hospital it is now selected in over 75 per cent. of the cases formerly anæsthetised with ether[27]. The gas is available compressed in steel bottles at a pressure of 75 lb.; it is inflammable, and it is important to remember that precautions, similar to those employed with ether and ethylene, should be taken in order to minimize the risk of explosion. On account of its present comparatively high cost, it is economically impracticable to administer cyclopropane by any other method than that of a closed circuit employing carbon-dioxide absorption and the various types of apparatus described above are all suitable for this purpose. In order to obtain the best results, however, it is essential for no leakage to occur at the junction between the apparatus and the patient.

The concentration of cyclopropane necessary to secure full surgical anæsthesia is in the region of

10–20 per cent.[27] and, as it should always be administered with an oxygen percentage greater than 20, it follows that a considerable proportion of nitrogen may be present in the circuit without ill effect. The usual practice, however, is to employ a cyclopropane-oxygen mixture. If the proportion of cyclopropane rises to 45 per cent., respiratory failure is apparently produced but, if this large percentage is secured in the presence of high oxygen concentrations, such respiratory arrest has not been found to cause harm provided ample tidal exchange is artificially maintained.[27] The experiments of Seevers and others[22] indicate that in dogs respiration fails before the circulation and there is also a large margin between respiratory and circulatory failure. In order to investigate further the action of cyclopropane on the cardio-vascular system Waters and Schmidt[27] submitted five clinical cases to electrocardiography during anæsthesia and in four of them found that the patient showed no electro-cardiographic departures from normal other than a moderate slowing of the heart rate.

In the single remaining case the following abnormalities were noted: during induction there was evidence of transient heart block in lead 2; after 1½ hours operating with deep anæsthesia the tracing showed an inverted diphasic *P* wave and a shortened *P-R* interval. Ventricular extrasystoles were also observed.

As the patient passes rapidly through the various stages of anæsthesia, it follows that a certain amount of diligence is required in order to obtain the best results from cyclopropane. Two important points should be remembered by those unacquainted with the properties of this gas when administering it as an anæsthetic.[27] First, although it is a gas and is without irritant effect upon the respiratory tract it has the potency of chloroform and ether. In consequence, a mixture containing a dangerously high proportion of cyclopropane can be inhaled without inducing a protective laryngeal spasm. The anæsthetist therefore must be on his guard and not increase the percentage of the gas at too rapid a rate. The makers of cyclopropane recommend introducing the gas at a rate of 600 to 700 c.cm. per minute for a period extending up to two or three minutes and then waiting several minutes to permit distribution of the gas in the tissues and the development of the maximum narcotic effect. Even so, Sykes[26] states that the desired depth of anæsthesia is reached in three or four minutes. Secondly, cyclopropane is not a respiratory stimulant and the initial increase in rate and amplitude of respiration, which is a characteristic of the more commonly employed anæsthetics, does not occur. Cyclopropane, if administered as it should be, with excess of oxygen and without excess of carbon dioxide, may not cause any change in the minute volume or respiratory rate until depressive doses are reached. Indeed, the minute volume may even be reduced on account of the high oxygen concentration employed.

Anæsthesia produced by cyclopropane is quiet and there is good muscular relaxation. Sykes[26] states that it resembles that produced by chloroform. Seevers[22] points out that premedication with morphine reduces the amount of cyclopropane necessary to secure full surgical anæsthesia by about 12 volumes per cent. and premedication with half the dose of the opium derivative usually employed, together with a full dose of hyoscine is advised. Recovery is rapid, and provided the anæsthetic concentration has been reduced during the final stages of the operation, awakening resembles that from nitrous oxide or ethylene. The incidence of post-anæsthetic complications does not seem to differ markedly from that of other gaseous anæsthetic agents; but, curiously, it has been stated[27] that nausea and vomiting have been commoner after the administration of this gas for minor than for major operations. Cyclopropane, however, presents many advantages as an anæsthetic in thoracic surgery for the quiet respiration, ample oxygen supply and quick recovery of the cough reflex render it of particular service in these circumstances.

DIVINYL ETHER

Divinyl ether or divinyl oxide is now obtainable mixed with stabilizing agents under the trade name of vinethene. Chemically it represents ethylene plus ether and it was introduced in the hope that such a compound might prove advantageous as an anæsthetic. It is a colourless liquid which is more volatile but not more explosive than ether; it possesses a sweetish ethereal odour and it is comparatively non-irritating to the respiratory tract. The original experiments by Gelfan and Bell[8] indicated that induction was slow, prompt and even, that muscular relaxation was good and that there was a rapid recovery period with very little nausea.

Divinyl ether can be administered either by the open drop method or by the closed method with or without carbon-dioxide absorption. The open method, in which the anæsthetic is slowly dropped on to a gauze mask, is apparently favoured by Goldschmidt,[9] at least until more experience has been gained with the use of this agent in the human patient; but Sir Francis Shipway, in his valuable report on the use of vinethene[24] leans towards administration by closed methods. In any circumstances, it is believed to be advisable to guard against anoxæmia because it has been suggested[14] that this condition is a factor in the production of certain untoward effects, such as twitchings, observed during anæsthesia produced by divinyl ether in dogs. As with cyclopropane, anæsthesia is characterized by rapid induction and quick recovery. The rate of administration during induction by the open method should be about one drop per second, and the average amount necessary for the maintenance of anæsthesia is 2 c.cm. per minute. Apparently, consciousness is lost after a few inhalations and, as an indication of the rapidity of action, Goldschmidt[9] states that the usual time from the beginning of an administration to the production of relaxation of a sufficient degree for the performance of laparotomy is about three and a half minutes; with extra-abdominal operations the time is less. Recovery is rapid and, if the anæsthetic be given slowly during the terminal stages of the operation, it is possible to have the patient talking at the time of the introduction of the last skin suture.

Regarding relaxation, Shipway's experience[24] is that complete muscular relaxation is not always obtained. In a series of 461 patients aged from 5 months to 82 years and suffering from a number of conditions ranging from tic douloureux to intracranial tumour, Goldschmidt[9] found that muscular relaxation was good and equalled that obtained with ether. It was sufficient for the most extensive laparotomy and also for orthopædic manipulations. All writers upon divinyl ether appear agreed that the incidence of post-anæsthetic complications is at a very low level. Shipway[24] concludes that there is a remarkable absence of after-effects, particularly vomiting, and Goldschmidt[9] found that vomiting, including simple eructation of mucus, occurred in only 9·5 per cent. of patients. Furthermore, there was a striking infrequency of vomiting in those who had recently partaken of food before the administration of the anæsthetic. The risk of post-operative respiratory complications was also minimized on account of the comparative lack of irritation of the respiratory tract. Occasionally however, there was a considerable secretion of mucus even though atropine had been previously administered. In no instance was there any evidence of renal irritation, although the anæsthetic was administered several times to the same patient.

Divinyl ether produces a slight fall in blood pressure in human subjects; excessive doses cause failure of respiration closely followed by cardiac failure[4]. An additional sequel, however, of the administration of this substance has been the demonstration by Goldschmidt of the occurrence of necrosis of the liver[9]. He has been able to produce a central lobular necrosis resembling, but less marked than, that following chloroform in dogs and he is of the opinion that the risk of this complication varies directly with the length of the anæsthesia. Previous under-nutrition is also a predisposing factor, and in these circumstances, the livers of monkeys have been shown to be susceptible to the influence of the drug under consideration. Recently, however, Bourne and Raginsky[4] have investigated the effect of vinyl ether anæsthesia in normal dogs by means of the bromsulphalein liver function test and they have concluded that liver function is not thereby appreciably altered. In some instances in which cyanosis was a feature of the anæsthesia, moderate liver damage occurred but this is ascribed to the effect of the anoxæmia and not to the drug. Furthermore, these workers found that the effect on the liver function of partially starved dogs was not appreciably different from that observed in the normal animal. Similar divergent views are not uncommonly encountered regarding the effect of other anæsthetics, particularly certain members of the non-volatile group, upon liver function. It is difficult to explain this lack of harmony but it must not be forgotten that the results obtained from animal experiments and laboratory investigation, both indispensable for the proper evaluation of the properties of every new anæsthetic, may be modified in the human subject. The final test of the suitability of any new anæsthetic is dependent upon actual experience with the patient and, if the anticipated disability fortunately does not occur in these circumstances, it should, nevertheless, be interpreted as indicating the need for caution in appropriate cases.

SODIUM EVIPAN

The introduction of the sodium salt of N-methyl-C-C-cyclo-hexenyl-methyl barbituric acid in 1932 marked a new departure in the practice of anæsthesia for the intravenous injection of aqueous solutions of this substance in suitable dilution is quickly followed by deep anæsthesia persisting for only a short period and succeeded by rapid recovery. The nearest previous approach to this effect had been obtained with certain other derivatives of barbituric acid; for example, sodium amytal, nembutal and pernocton, but with these substances, induction occupies some minutes and recovery is prolonged. It is interesting to reflect that barbituric acid itself possesses no hypnotic effect and the potency of its derivatives in this respect is dependent upon the stability of the side chain. The simpler derivatives are decomposed comparatively slowly, resulting in prolonged hypnosis, while the more complex compounds are broken down rapidly and only possess a short-lived anæsthetic action. The peculiar properties of sodium evipan are therefore probably dependent upon its complex chemical constitution which results in rapid and complete decomposition.

Sodium evipan has a high coefficient of effectiveness; Malony and Hertz[17] found that the toxic-anæsthetic-hypnotic ratios in the rat were 100–36–18. The drug is a white crystalline powder which is dissolved immediately before use in distilled water in such quantity as to make a 10 per cent. solution. It is administered by ordinary intravenous injection into one of the veins of the antecubital fossa, and as it is not infrequently employed as an anæsthetic for the extraction of teeth, it is believed to be desirable that the patient should be in the recumbent position. The amount required in order to secure anæsthesia varies with individual requirements but 0·16 c.cm. of this solution per kilogramme of body weight is probably the maximum amount which should be administered. On account of the difficulty of accurately estimating individual doses the system introduced by Lauber[13] is frequently employed. In this method the solution is injected at a rate of 4 c.cm. per minute, and immediately the injection begins the patient begins to count at a slow constant rate. As the effect of the drug is manifested, the speech becomes "slurred" and eventually ceases. The amount of solution administered at the moment of cessation of counting is noted, and the injection is continued at the same constant rate until, for a short operation, as much again and, for a long operation twice as much again have been introduced. It may be that these precautions are unnecessary, for Serocca has stated[23] that the injection of 10 c.cm. for all cases, irrespective of weight, has produced no ill effects, but, as certain subjects, notably the elderly and cachectic, are commonly anæsthetized by exceedingly small doses of the drug, it seems wise to observe them. Children, apparently, take sodium evipan equally as well as adults. The drug does not damage veins, does not predispose to the formation of thrombi, and does not cause injury to the perivenous tissues.

On account of the rapid loss of consciousness, which usually occurs within twenty seconds, and the short duration of anæsthesia it is essential that the patient should be prepared for operation before administration of the drug is begun. Likewise an attendant must be at hand in order to maintain an airway when the necessity arises. Anæsthesia is characterized by abolition of the faucial and corneal reflexes and by moderate dilatation of the pupil. If an adequate dose has been administered, there is excellent muscular relaxation. Respiration is quiet and steady but instances have been reported[25] of respiratory spasm and distress observed early in anæsthesia; this condition, however, yields to the passage of an intratracheal catheter. The blood pressure falls 10 to 20 mm. Hg in both man and animals. In an investigation carried out by Jarman and Abel[11] on thirty cases before and after the use of sodium evipan no alteration was detected in the blood urea, blood sugar or urine up to 52 hours after the operation. Nothing was found to show that the drug exercised any deleterious effect on any organ. Kennedy and Naragana[12] found no significant change in the blood sugar of rabbits and guinea-pigs but they observed that respiration was slowed and temperature was reduced. Recovery of consciousness is usually rapid, but sometimes there is a certain amount of restlessness which, it is believed, can be obviated by warming the solution before injection. Not infrequently, however, the recovery period is succeeded by more or less natural sleep which persists from half to one hour and from which the patient can be roused easily. Unlike most derivatives of barbituric acid, sodium evipan produces little or no retrograde amnesia. The average duration of anæsthesia following the indicated maximum dose of sodium evipan is fifteen to twenty minutes and, as this period is insufficient for many operative procedures, various methods have been employed in an attempt to obtain prolongation. The pre-anæsthetic use of opium derivatives[11] is useful for this purpose and, although the employment of opium in conjunction with barbituric acid derivatives in full doses is not usually wise, the rapid disintegration of sodium evipan minimizes the risk of prolonged respiratory depression which, not infrequently, accompanies this combination. Attempts have been made successfully to prolong anæsthesia indefinitely by repeated injections of the drug, but it is possible that the same result could be obtained by simpler and equally safe methods. The prolongation of anæsthesia, however, by the subsequent administration of a volatile inhalation anæsthetic, appears to be quite satisfactory.

AVERTIN

Avertin increases in popularity as a safe and reliable basal anæsthetic, and personal experience of its use for seven years supports this view. An indication of the mortality associated with this drug is shown by the parliamentary statement that in the six months ending March 31, 1934, five deaths were certified in this country as having been attributable to or occurring during anæsthesia in which avertin was used. A recent development regarding the use of avertin has been the suggestion[5, 19] that it should be employed in much larger doses than are usual at the present time and, as in the early days of this drug, attempts are now being made to secure full surgical anæsthesia without the super-imposition of an inhalation anæsthetic. Boyd[5] states that children have the ability to detoxicate and excrete avertin easily and that this apparently large dose is well tolerated. A dose of 0·12 gm. per kilogramme of body weight in adults causes more depression of the vital centres than a dose of 0·175 gm. in children. He therefore advocates the use of morphine plus avertin as a complete anæsthetic in children and he recommends the following combination:—

Avertin 0·175 to 0·2 gm. per kilogramme of body weight; morphine 1/40th to 1/10th of grain according to age and atropine according to age together with enough 1 per cent. solution of novocaine injected locally to produce a field block. A 3 per cent. solution of avertin is recommended and has been found to be better retained than the usual 2½ per cent. solution.

In a series of 700 cases Boyd encountered no deaths attributable to avertin: eighteen children presented complications which caused anxiety but the majority improved after the injection of coramine. There were two instances of post-operative respiratory trouble. He believes that, provided very young and cachectic children are excluded, large doses of avertin, combined with other drugs as noted above, approach more nearly the ideal anæsthetic than any other substance and, if a careful watch is maintained for danger signals, they can be given to children as a complete anæsthesia with safety. Morton[19] also advocates the use of avertin in larger doses than usual in order to obtain full surgical anæsthesia. In this connection, however, it is interesting to remember that many authorities do not recommend the employment of morphine in connection with avertin. For example, it has been proved[2] by animal experiment that the combined effect of morphine and avertin is greater than the sum of the separate effects of the two agents and it is concluded that, in such circumstances the depressant effects on respiration are marked and are greater than the increased analgesia warrants.

The use of B.D.H. universal indicator instead of the commonly employed Congo-red as a test for the purity of avertin solutions has been recommended by Ashworth[1]; the results of experimental work show that such solutions should not be prepared at a temperature greater than 40° C. and that they should be administered not later than an hour after preparation. Personal experience indicates that simplicity in preparing avertin is achieved by making a 2 per cent. solution at room temperature without the use of heat. Under these conditions the drug dissolves

easily if shaken, it can be administered forthwith, and the resulting effect has given complete satisfaction to patient and anæsthetist alike.

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FAVOURITE PRESCRIPTIONS

NO. X—THE PHARMACOPŒIA OF ST. THOMAS'S HOSPITAL

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AS in the case of the other great London hospitals, at St. Thomas's the earliest form of the Hospital Pharmacopœia seems to have been a manuscript copy of the most commonly used prescriptions, which would most probably be kept in what was called the apothecary's shop for the use of the apothecary. This manuscript, so far as can be discovered, no longer exists, and the earliest available copy of what was called the "Dispensatory" forms part of an octavo volume of some 350 pages by a distinguished physician named Robert Poole. He named his book *A Physical Vade Mecum, or Fifth Gift of Theophilus Philanthropos*, and it contains, besides the dispensatory of St. Thomas's Hospital, "a catalogue of the diseases and the method of their cure prescribed in the said Hospital" as well as the dispensatories of St. Bartholomew's and of Guy's.

Poole's previous four books or, as he called them, Gifts, were mainly theological and he seems to have turned his attention to medicine when he was rather older than most students. His book appeared in 1741 and provides an unusually detailed account of the hospital administration of the time and of the relations and responsibilities of the professional staff and the governors. The Hospital Pharmacopœia, as he gives it, contains an immense number of prescriptions and it is difficult to believe that all those he quotes were in common use, but he distinguished by special marks some which he has derived from the old manuscript dispensatory and others which he says "are taken from a printed copy of the Hospital, bearing date An. Dom. 1718." Neither of these sources now exist, so far as can be discovered, but the printed one is possibly the same as that in the collection of hospital dispensatories printed in 1718 under the title of *Pharmacopœia Pauperum.* Of all the preparations which Poole describes there are hardly any which are in use to-day. His outlook is that of the herbalist and his materials do not seem even to include Epsom salts, while he gives recipes for an infusion of millepedes, and for Aqua limacum of which snails and earthworms form the chief ingredients.

EARLY EDITIONS

In 1787 the Hospital Pharmacopœia was published in its present size. It bears no author's name but is clearly an official compendium and the copy in St. Thomas's library is bound up with the pharmacopœia of the Royal College of Physicians dated 1788 and was intended to be supplementary to the *Norma Pharmacopœia Londinensis,* since the preparations given in this work are only named and not described in full.

Although the first pharmacopœia was printed only forty-six years after the *Physical Vade Mecum,* the contrast between the two is great and shows how much the medical outlook had altered during that time. It contains among other prescriptions one for a Pulvis sudorificus, which consists of equal parts of ipecacuanha root and opium, and also may be quoted the formula for Haustus solutivus, which is the earliest mention of what is essentially the Haustus sennæ compositus of 1935:—

℞ Salis cathartici amari drachmas sex,
Aquae fontanae uncias tres,
Tincturae senae drachmas sex,
Fiat Hasutus quarto quoque mane sumendus.

The next edition I can find is dated 1800 and is bound up with the same 1788 College Pharmacopœia. The preparations are not very different from those of the previous issue, but now they are all given titles referring to their composition and not to their use. Thus the Pilulæ aperientes of 1787 have become the Pilula colocynthidis composita of 1800 and similar changes have been made in each case. The edition of 1818 does not differ greatly from its predecessor, but in it there appears, for the first time, the prescription

℞ Extracti colocynthidis co. - - - gr. xlviii.
Hydrargyri submuriatis - - - gr. xii.
Syrupi simplicis quod satis est
Contunde, et divide in pilulas xii.

a formula which is still present in the 1935 edition though now expressed as the recipe for one tablet.

After 1818 there is a long gap until 1855. This gap covers the whole period of service to the hospital of Dr. Robert Williams, who was a member of the Staff until 1845 and who is noted for his discoveries of the specific actions of the bromide and iodide of potassium. In this edition there is to be found for the first time a Mistura potassii iodidi, three grains to the ounce, but no mention is made of the bromide. There is mention also of various salts of morphine and sulphate of quinine, though no other alkaloids seem to have been known.

It would be wearisome to trace the various changes that the Pharmacopœia has gone through during the last hundred years. They have been the same as the changes in medicine itself, and it is proposed now to deal in more detail with the 1935 issue.

PRESENT EDITION

Among poultices it seems worth while to note the kaolin poultice, which tends nowadays to replace the older linseed or mustard. The formula given is as follows:—

		Parts.
℞	Kaolin, in very fine powder	574
	Boric acid, in very fine powder	25
	Menthol	0·25
	Methyl salicylate	0·5
	Oil of peppermint	0·25
	Glycerine	400

The enemas call for no special comment. The old Enema nutriens has disappeared and its place is taken by an Enema glucosi consisting of half an ounce of glucose in ten ounces of water.

Lotions.—One of the most recent additions to the Pharmacopœia has been brought about by the development of the tannic acid treatment of burns. There are two difficulties involved in the storage of a solution of tannic acid. It quickly becomes mouldy, and, if this is overcome, it slowly becomes hydrolysed and inert. To overcome the first difficulty the following formula is used for Lotio acidi tannici:—

℞	Tannic acid	175 grains
	Mercuric chloride	4¾ grains
	Distilled water	to 1 pint.

This solution will not become mouldy but the tannic acid will become slowly hydrolysed and useless in about two months. For those therefore who only need the solution at long intervals it is recommended to make a powder to the formula

℞	Tannic acid	17½ grains
	Mercuric chloride	7/16 grain

which will keep indefinitely. This when dissolved in 2 ounces of water makes the lotion containing 2 per cent. of tannic acid which is the standard strength used.

MIXTURES

The Haustus sennæ compositus now in use has the formula

℞	Magnesium sulphate	240 grains
	Liquid extract of liquorice	30 minims
	Infusion of senna	to 1 ounce

As mentioned earlier, it is the oldest prescription in the Pharmacopœia and in essentials dates from 1787. Other somewhat less drastic aperient mixtures include the familiar Mistura alba, Mistura cascaræ sagradæ which has the formula

℞	Liquid extract of cascara sagrada	30 minims
	Liquid extract of liquorice	30 minims
	Aromatic spirit of ammonia	20 minims
	Chloroform water	to 1 ounce

and Mistura salina laxans

℞	Magnesium sulphate	30 grains
	Potassium citrate	20 grains
	Tincture of hyoscyamus	15 minims
	Chloroform water	to 1 ounce

The purchase of proprietary remedies is always a financial strain on a hospital, and it is necessary to imitate these on the premises in all possible instances. The last edition of the Pharmacopœia contains a suspension in water of very finely divided magnesium hydroxide, under the name of Mistura magnesiæ and also a Mistura magnesiæ et paraffini which consists of the same suspension in which is also suspended 33⅓ per cent. of liquid paraffin.

After purgative mixtures, the greatest demand is perhaps for mixtures for gastric ailments, and there are various bismuth mixtures of which the Mistura bismuthi cum soda is perhaps the best known. It contains 15 grains each of bismuth carbonate and sodium bicarbonate in an ounce of peppermint water. In the earlier editions of the Pharmacopœia some glycerine or gum was also present but this is now thought unnecessary.

All the mixtures which need the addition of chloroform to preserve them from mould are now made with the emulsion of chloroform instead of the more expensive tincture in those cases in which chloroform water cannot be used. The formula for this emulsion is:—

℞	Chloroform	1 ounce
	Tincture of senega	60 minims
	Water	to 1 pint

Mix and shake.

In order to neutralize the stomach contents for the treatment of ulcers, various mixtures of alkalies have been used in the last few years. It is well known that the carbonates of bismuth, magnesium and sodium formed the original prescription. The present standard powder for this purpose is well known and in the St. Thomas's Pharmacopœia is named Pulvis bismuthi compositus:—

℞	Bismuth carbonate	1 part
	Heavy magnesium carbonate	4 parts
	Sodium bicarbonate	4 parts
	Chalk	4 parts

It is less well known that it is possible to do without the expensive bismuth carbonate altogther, and to effect this there is a substitute powder called Pulvis cretæ alkalinus composed of:—

℞	Heavy magnesium carbonate	8 parts
	Sodium bicarbonate	3 parts
	Chalk	12 parts

This powder seems as effective as the standard one and is considerably more economical in view of the quantities required.

Either can be modified to suit individual patients by changing the proportions of magnesium or calcium according to the need for an aperient or for the opposite. There are provided, of course, several other mixtures containing bismuth, the first one appearing in the Pharmacopœia of 1867, where it was given with calumba, but the present mixtures are simple suspensions of bismuth carbonate in peppermint water either alone or with light magnesium carbonate or sodium bicarbonate according to what is needed. Besides these mixtures there are also tablets of bismuth and soda and the more familiar "soda mint" containing $\frac{1}{8}$ grain of ammonium carbonate in addition to the soda and oil of peppermint.

After remedies for indigestion, perhaps the most important group is that of the expectorant mixtures, and of these the oldest (1867), Mistura cascarillæ composita is still widely used.

℞	Camphorated tincture of opium	15 minims
	Vinegar of squill	20 minims
	Emulsion of chloroform	10 minims
	Infusion of cascarilla (B.P.C.)	to 1 ounce

For children Mistura expectorans is valuable :—

℞	Dilute solution of ammonium acetate	120 minims
	Vinegar of squill	15 minims
	Tincture of ipecacuanha	15 minims
	Glycerin	40 minims
	Chloroform water	to 1 ounce

Dose for infants, 60 to 120 minims.

For adults with a dry cough, the Mistura ammoniæ cum senega is often used :—

℞	Ammonium carbonate	4 grains
	Tincture of ipecacuanha	10 minims
	Infusion of senaga	$\frac{1}{2}$ ounce
	Chloroform water	to 1 ounce

A reflex expectorant is combined with iodide in the Mistura potassii iodidi alkalina :—

℞	Potassium iodide	3 grains
	Potassium bicarbonate	10 grains
	Ammonium carbonate	3 grains
	Chloroform water	to 1 ounce

Besides the well-known Gee's linctus, there is also a

Linctus codeinæ :—

℞	Syrup of codeine phosphate (B.P.C.)	30 minims
	Citric acid	1 grain
	Glycerine	10 minims
	Emulsion of chloroform	3 minims
	Mucilage of tragacanth	to 60 minims

Among the mixtures prescribed for their action on the central nervous system, the Mistura strychninæ acida has been slightly modified in the last issue and now is as follows :—

℞	Solution of strychnine hydrochloride	2 minims
	Dilute hydrochloric acid	10 minims
	Syrup	30 minims
	Compound infusion of gentian	½ ounce
	Chloroform water	to 1 ounce

A valuable hypnotic is the Mistura chloralis composita :—

℞	Chloral hydrate	20 grains
	Potassium bromide	20 grains
	Liquid extract of liquorice	30 minims
	Chloroform water	to 1 ounce

and as a nervous sedative there is provided a Mistura phenobarbitoni composita :—

℞	Phenobarbitone (soluble)	½ grain
	Potassium bromide	10 grains
	Chloroform water	to 1 ounce

but since this mixture is unstable, only comparatively small quantities can be dispensed at one time.

Among recent additions to the Pharmacopœia are certain solutions for injection. These include a solution of phenol and glycerine for the treatment of hæmorrhoids :—

℞	Phenol	48 grains
	Glycerine	120 minims
	Distilled water	to ½ ounce.

Dose 2–5 minims (paravenously).

The following is used for varicose veins :—

℞	Quinine hydrochloride	5 per cent.
	Urethane	2½ ,,

in distilled water.

Powders.—All the powders which are not too bulky are now dispensed as tablets which may be crushed up by the patient if necessary, and the tablet form has also replaced the old pills, several of which have already been mentioned.

FORMULÆ FOR SPECIAL DEPARTMENTS

The present Pharmacopœia contains special sections devoted to the preparations used in the Skin, Eye, and Ear, Nose, and Throat Departments.

Among the preparations used in the *Eye Department* the ointments or " Oculenta " are the only ones which call for any special mention. They are all made up with a basis of:—

Anhydrous wool fat - - - -	10 per cent.
Liquid paraffin - - - - -	10 per cent.
Yellow soft paraffin - - - -	80 per cent.

which gives a better consistence for the purpose than the usual ointment bases.

The boric acid ointment contains 4 per cent. as against the 10 per cent. of the boric acid ointment of the British Pharmacopœia. The yellow oxide of mercury ointment is 1 per cent., and in the current Pharmacopœia is an Oculentum zinci et ichthammolis containing:—

Zinc oxide - - - - - -	15 per cent.
Ichthammol - - - - - -	1 per cent.

In the *Ear, Nose and Throat Department* the most recent additions are the Nebulæ to be sprayed or dropped on to the nasal mucosa. The Nebula ephedrina et mentholis is of value in catarrh and consists of:—

℞	Ephedrine - - - - - -	5 grains
	Menthol - - - - - -	10 grains
	Liquid paraffin - - - - -	to 1 ounce

The drops for the ears are made up in olive oil and have rather the composition of ointments.

Guttæ calaminæ compositæ:—

℞	Calamine	40 grains
	Zinc oxide	20 grains
	Lime water	180 minims
	Olive oil	to 1 ounce

Guttæ hydrargyri nitratis :—

℞	Dilute mercuric nitrate ointment	40 grains
	Olive oil	to 1 ounce

For *obstetric* use there is a Mistura ergotæ and it is interesting to observe that this retains the liquid extract of ergot of the 1914 British Pharmacopœia in preference to the 1932 preparation, a preference which is shared by many prescribers and which recent research has justified.

As has been the practice since at least 1902, the second half of the book consists of notes on the "official" drugs of the 1932 British Pharmacopœia, and gives practically all that a prescriber needs to know of them. There is finally a section on poisons and antidotes and a number of useful tables.

While the aim of such a book is primarily to help those who are carrying on the work of the hospital, it is hoped also that it may be of interest both to old students of St. Thomas's, who can compare the present Pharmacopœia with its predecessors which they knew, and to those from other hospitals who may like to compare it with their own.

PRACTICAL NOTES

TREATMENT OF CARBOLIC ACID POISONING

In view of the popular use of products of the carbolic acid group, especially lysol, for suicidal purposes it is important that the correct treatment of poisoning by such substances be clearly understood. L. Goodman and A. J. Geiger (*American Journal of the Medical Sciences*, August, 1935, cxc, 206) discuss this at length, pointing out the ineffectiveness of many of the antidotes advocated in the past such as milk, egg albumen, alcohol, glycerine, sodium sulphate, potassium permanganate and syrup of lime. Recently great claims have been made for paraffin oil (liquid paraffin) as a selective solvent to prevent absorption. These claims have been critically examined by Goodman and Geiger who were unable to confirm the good results obtained. They found, however, in the course of their researches that olive oil appeared to offer a valuable remedy, since carbolic acid is more soluble in this oil than in water. The oil is a common, cheap, bland and not unpleasant household commodity and in skilled hands the recovery rate after olive oil treatment was promisingly high. It is recommended that olive oil should be administered promptly in as large a quantity as possible, preferably by getting the patient to drink it if he is able. The stomach tube should then be carefully passed and lavage performed with generous quantities of olive oil, some of which should be allowed to remain in the stomach. Other symptomatic and supportive measures should be employed as the particular needs of the case dictate. The value of fluid by routes other than the alimentary canal is stressed and blood transfusion may be useful.

INDICATIONS FOR PARATHYROID THERAPY

The use of parathyroid gland in the form of its active principle represents an advance in therapeutics but great care is necessary in the employment of such a powerful remedy. J. A. Aub (*Journal of the American Medical Association*, July 20, 1935, cv, 197) has recently reviewed the whole subject. The clinical use of parathyroid must, he states, be most carefully controlled by the estimation of the blood calcium; a serum calcium level above 12 to 13 mgm. per 100 c.cm. is never desirable. The dosage will vary considerably for individuals. In normal persons as many as 500 units a day may be necessary to raise the serum calcium from 10 to 12 mgm. per 100 c.cm.; in low-calcium tetany 75 units a day may produce a much greater increase. Repeated doses are better than a single injection and the effect of the hormone is not apparent until after about four hours. The chief indication for parathyroid hormone is in tetany associated with a low serum calcium. Because of the latent period in its action parathyroid hormone is not so dramatic as intravenous calcium. It is recommended that 10 c.cm. of a 20 per cent. solution of calcium gluconate be given slowly intravenously for immediate relief of the tetany, with parathyroid extract intramuscularly for its prolonged effect. It should be noted that with the type of extract now available an apparent immunity to its effects gradually develops if it is used for several months. Parathyroid therapy is also used for its decalcifying effects upon bones when abnormal metals have been stored in them, as, for example, in lead poisoning. For decalcifying effects in other conditions such as arteriosclerosis, otosclerosis or myositis ossificans the hormone should not be used in the present state of knowledge. The daily injection of 250 units of parathyroid hormone in persistent œdema has been reported as giving good results and other conditions in which it has been used, but for which there is as yet no adequate evidence of its effectiveness, include asthma, vasomotor rhinitis, hæmorrhage, jaundice, and gonorrhœal epididymitis and salpingitis.

IODINE POWDER FOR DISCHARGING EARS

R. H. Bettington (*Medical Journal of Australia*, June 15, 1935, i, 747) describes the iodine powder method of treating chronically discharging ears as the best available. He has modified slightly the original method advocated by R. Scott Stevenson and in a period of twelve months has treated all types of " running ears " unless there was a definite contra-indication such as semi-occlusion or complete occlusion by a furuncle. The details of the method as used by Bettington are as follows : The ear is first syringed gently to remove any discharge or powder from previous treatment. It is then dried, first with swabs and then with puffs of dry air from a rubbered vulcanite insufflator. When all the debris has been removed iodine powder is blown in from the insufflator. The powder used is a mixture of iodine (0.75 per cent.) and boracic acid (99.25 per cent.). The iodine is resublimated and dissolved in spirit, and the boracic acid should be very finely powdered and quite dry. The mixture dissociates rapidly and should be renewed at least once a fortnight, being kept in a well-stoppered bottle.

DIET DURING PREGNANCY

Modern work is tending to insist more and more upon greater care being taken over the diet of the pregnant woman. An important discussion held earlier this year was opened by Dame Louise McIlroy (*Proceedings of the Royal Society of Medicine*, August, 1935, xxviii, 1385), who concluded by advocating the following : Milk, 1–2 pints daily; green vegetables once or twice daily; one or two eggs daily; sea-fish (for its iodine content) twice weekly or more frequently. Calf's liver can be given once a week and the rest of the diet can be left more or less to the patient's wishes. If it appears to be deficient it is suggested that it be supplemented by 2 ounces of cod-liver oil daily. " Women should be taught how to purchase and cook food in order to obtain the best possible value from it for the supply of their own wants and that of the fœtus." It is suggested that routine weight-taking in an antenatal clinic gives a valuable indication of the nutrition of the mother. Excessive weight should lead to a cutting down of fats and carbohydrates and salt should be excluded for a few weeks. If weight rises suddenly there is a danger of impending kidney damage or toxæmia.

LACTIC ACID MILK IN INFANT FEEDING

The teaching of Marriott regarding the use of undiluted milk acidified with lactic acid for the feeding of infants, both when suffering from certain digestive disorders and when quite healthy, has been followed in many parts of the world. A recent confirmation of the value of this method by L. Exchaquet, of Lausanne (*Revue médicale de la Suisse Romande*, July 25, 1935, lv, 622) contains several points of interest. The preparation used has been "pelargon" (a Nestlé product corresponding to the powdered buttermilk "eledon" recommended in certain digestive disorders) and it is made up in the usual strength for powdered milk of one part of the powder to seven parts of water. In the mixture used in Lausanne 2 per cent. cornflour or rice-flour with 5 per cent. sugar have also been added. The product is said to be agreeable to the taste, with only a faint acid flavour and a scarcely perceptible "clotting" of the casein in a very fine flocculation. The concentration of the acid milk is such that much smaller total quantities of fluid are given daily as compared with diluted milk mixtures. Extra drinks of water must therefore be given, in the hot weather in particular. Fruit juice is given at three months and vegetable broth is also recommended when the infant reaches 10 to 12 lb. in weight. In a series of nearly a hundred babies the majority took the acid milk with obvious relish and it was refused only rarely.

USES OF ANTIMONY

Although historically of some antiquity, antimony barely survived into this century save as an emetic. In the last twenty years, however, the value of antimonial preparations in certain tropical disorders has led to a "renaissance," discussed recently in some detail by R. Levent (*Gazette des hôpitaux*, July 24, 1935, cviii, 1009). Organic combinations with acids of the fatty or aromatic series have been devised by the chemists to secure a maximum therapeutic effect with a minimum of toxicity. The intravenous and intramuscular routes are generally used now for securing antiparasitic action and this usually means a dilute solution. The general principles are much the same for whatever preparation of antimony is selected. In using "tartar emetic" Levent recommends for adults two or three injections weekly with a dose of 2 to 3 centigrammes in a 1 to 2 per cent. solution. The dose can be increased up to maximum of 10 centigrammes per injection and 2 to 2.5 grammes as a total for any one series of injections. Of the modern preparations "stibosan" can be given in much greater concentrations (up to 50 per cent.) and is well tolerated intravenously. "Antimosan" is a preparation containing sulphur and is used intramuscularly in a concentration of 7 per cent. The main indications for antimony include trypansomiasis, bilharzial infections, filarial infections and more especially the various forms of leishmaniasis in which disorders the most spectacular results have been obtained. Levent also records good results with "stilbyal" in certain forms of Hodgkin's disease (10 to 40 centigrammes every other day).

GLAUCOSAN IN GLAUCOMA

The effect of adrenaline upon the pupil of the eye is made use of in ophthalmic work in connexion with certain types of glaucoma. C. Hamburger (*British Journal of Ophthalmology*, August 1935, xix, 455) points out that it was not until lævo-rotary adrenaline or "glaucosan-drops" was made available that a purely local effect could be guaranteed. With this preparation Hamburger particularly urges the treatment of glaucoma with severe iritis. The dilatation of the pupil thus obtained is best maintained by atropine. Secondary glaucoma is considered as another important therapeutic indication for glaucosan for its power of rupturing synechiæ. The drug is also valuable for glaucoma cases unsuccessfully operated on or with but transitory success. Glaucosan drops can be used up to twice daily in the elderly—after a cautious preliminary stage of weekly or biweekly application—and, according to Hamburger, many an operated glaucoma eye has thus been spared another operation for months and years.

PROTEIN THERAPY FOR CHANCROID

The rapid cure of chancroid or infections by the Ducrey bacillus by means of injections of a special vaccine is reported by D. O. Gorlin (*New York State Journal of Medicine*, July 15, 1935, xxxv, 729). This form of foreign protein consisted of the " dmelcos vaccine," a stock preparation of Ducrey bacilli in saline, 225 million per c.cm. The vaccine has been given intravenously beginning with 1 c.cm. and increasing by ½ c.cm. per dose, usually given every second day until cure was effected. Usually six injections were sufficient to effect this : the smallest number of injections necessary was 3 given over a period of six days and the largest number was 8, over a period of 16 days. Other cases were treated with gonococcal vaccine intravenously or with staphylococcal vaccine but the effects were not so rapid. Complications such as inguinal adenitis yielded readily to vaccine therapy. The injections were given in the evening and usually a " chill " and hyperpyrexia followed with subsequent sound sleep. No time was lost from work on account of the treatment and no ancillary surgery was necessary. It is suggested that the action of the vaccine is on the lines of " non-specific protein therapy."

A MORE ACTIVE PUERPERIUM

An attack upon the traditional management of the puerperium with its ten days' rest in bed and a plea for a more active programme is made by H. B. Atlee (*Canadian Medical Association Journal*, August, 1935, xxxiii, 144), who has now collected the results of his methods for over 500 patients in a period of seven years. The patient is allowed to sit up in bed on the day following labour for as long as she feels like it. When lying down she should lie on her side and abdomen rather than on her back, and should be encouraged to move about the bed. On the same day, under the supervision of a nurse, the patient carries out the first six of a series of twelve exercises designed to encourage movement of the trunk and limb muscles. On the next day she does all twelve exercises, and continues each day, doing each exercise more often. The patient is allowed to get out of bed on the fourth day, i.e. the third after delivery. She is helped to a chair about 3 feet from the bed, and sits up for half-an-hour, the time being increased each day. From about the sixth day onwards most patients can walk round their beds, and on the tenth day they walk about 100 feet to another room. This regime was at first only used for strictly normal cases, but in later years it has been allowed for patients running low sapræmic temperatures, after forceps deliveries, and with repaired perineal tears. It is claimed that there is no more risk of puerperal infection, prolapse or subinvolution with this more active programme, and the effect upon the patients' physical well-being and mental outlook is said to be greatly to the credit of the method.

REVIEWS OF BOOKS

Radiological Atlas of Chronic Rheumatic Arthritis (The Hand). By S. GILBERT SCOTT, M.R.C.S., L.R.C.P., D.M.R.E. Oxford University Press. London : Humphrey Milford, 1935. Pp. xiv and 78. 30 plates of radiographs. Price 25*s.*

THIS beautifully got-up volume with its excellent reproductions of radiographs of the various morbid conditions of the hand comprised under the term chronic rheumatic arthritis, but including also gout, will be of great value to all interested in the study of the subject, although many will find themselves unable to accept all the views of the author. The attempt to differentiate one form of arthritis to which the name " rheumatoid " is applied, from another called " infective," occupies a good deal of space, but many experienced clinicians regard the differences described as due to variations in resistance and virulence only. Radiology, while of the greatest assistance in diagnosis and in the study of these diseases, should be regarded as secondary to clinical observation and the study of pathology or mistaken conclusions will be drawn. The claim that the radiograph furnishes one of the most precise methods of diagnosing early gouty arthritis overlooks the value of determining the uric acid content of the blood. But these and other possible criticisms do not detract from the interest of the book.

Recent Advances in Diseases of Children. By W. J. PEARSON, D.M., F.R.C.P., and W. G. WYLLIE, M.D., F.R.C.P. Third edition, London : J. and A. Churchill, Ltd., 1935. Pp. x. and 566. Figs. 38, 23 plates. Price 15*s.*

Play in Childhood. By MARGARET LOWENFELD, M.R.C.S., L.R.C.P. London : Victor Gollancz, Ltd., 1935. Pp. 345. Price 8*s.* 6*d.*

From Birth to Maturity. By CHARLOTTE BÜHLER. London : Kegan Paul, Trench, Trubner & Co., 1935. Pp. 237. Price 7*s.* 6*d.*

THESE three books may fairly be reviewed together for the pædiatrician who could distil the essential wisdom from each and then effect a mixture of the results would be nearing the real secret of the management of the child in health and disease. " Pearson and Wyllie" in a third edition needs no introduction; many sections have been recast and revised to incorporate new matter; and modern views on the pathogenesis and treatment of many disorders of childhood are well summarized and discussed. Unfortunately, there is little indication in the pages of this volume that the child possesses a mind. Dr. Lowenfeld's book and the new translation from the German of Professor Charlotte Bühler's well-known study of the development of the normal child correct this omission but, like so many modern studies of the child's mind, neither of these seems to consider the influence of chemical changes or of bacterial toxins upon nerve cells. However, in each case, a more restricted field has been deliberately chosen for study. Dr. Lowenfeld's analysis of the play of about 200 children and her attempt to build up a theory of the nature of play in childhood and its place in the life of civilized man is a fascinating study, obviously deriving in part from Prof. Bühler's pioneer work, now happily available in English. The observations recorded in the latter are an impressive set of facts which it will take many years to understand fully. The second and third members of the trio here reviewed might aptly be called "Recent Advances in the Observation of Children." They contain much that is of importance to all workers among children.

Prognosis. Volume I. London: Published by the *Lancet.* Pp. x and 372. Price 10*s*. 6*d.*

In textbooks the subject of prognosis, which is generally admitted to be more difficult and exacting a task than treatment, is always placed earlier than treatment in the course of the description of a disease. The *Lancet* has now adopted what is probably a better way, for prognosis is largely determined by treatment, and in arriving at a prognosis it is commonly assumed that the diagnosis is correct and the treatment sound. The *Lancet* has previously brought out volumes of articles published in their columns on diagnosis and treatment, and now follows them up by a collection of articles by sixty-nine leaders and teachers on a wide field of subjects. The introductory article on general principles comes from Dr. Robert Hutchison, who, with philosophic wisdom, points out that the natural desire "to prophesy smooth things" at all costs must be guarded against, and later qualifies this by the advice that it is "probably judicious never to give a forecast unless it is asked for, and even then to speak cautiously but with as much hopefulness as circumstances allow." Among the other articles attention may be directed to Sir James Walton's account of the prognosis in the surgical treatment of peptic ulcers, Professor F. R. Fraser's remarks on toxic goitre, Professor Pannett on prostatic enlargement, Sir Arthur Hall on acute and chronic epidemic encephalitis, those on nephritis by Dr. Izod Bennett, on pneumonia by Professor J. A. Ryle, on pernicious anæmia by Professor L. J. Witts, Mr. Sampson Handley on simple moles and melanotic sarcoma, and Dr. S Vere Pearson on pulmonary tuberculosis.

Medicine for Nurses. By W. Gordon Sears, M.D., M.R.C.P. London: Edward Arnold and Co. Pp. 412. Illustrations 46. Price 8*s*. 6*d.*

This book is well written, well produced and well illustrated, but cannot but cause surprise to any reader, who is not a nurse, at the amount of medicine and surgery that nurses nowadays are expected to know. If Dr. Gordon Sears had not specifically stated in his preface that "the syllabus laid down by the General Nursing Council has been covered" and "many details which some might consider irrelevant have been included, because questions on these points have been asked in examinations," a reviewer would certainly have been inclined to criticize the amount that the author has given in detail. However, apparently it is true that the tendency in examinations is to demand more and more purely medical knowledge from the nurse, and this book should certainly prove helpful.

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23. NO

RECENT WORK ON OTOSCLEROSIS

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THE increase in recent times of our knowledge of otosclerosis may be considered from three points of view: clinical, pathological and therapeutic.

In the clinical field it has been shown that noticeable improvement of a temporary nature may occur in the hearing in various circumstances, when a sudden redistribution of blood in the body takes place. This phenomenon, which I have termed otosclerosis paradoxica, may arise when a cold draught of air strikes the patient when his superficial blood-vessels are dilated by warmth, and conversely a sudden relaxation of those blood-vessels may produce the same effect. The latter condition has long been known to occur on the inhalation of amyl nitrite. Correlated with this condition are two cases of otosclerosis recorded by Ashcroft in which remarkable improvement in the hearing occurred during the last few weeks of pregnancy. In both cases the improvement disappeared at once when delivery took place.

The importance of such clinical observations is obvious. In the first place they prove conclusively that the deafness of otosclerosis cannot be due solely to the fixation of the stapes in the oval window, for that condition could not by any possibility be removed for a period even of a few minutes by the inhalation of amyl nitrite or by the circumstances which bring about the improvement in hearing in cases of otosclerosis paradoxica. But the recognition of the condition of otosclerosis paradoxica is of further significance in that it indicates clearly that the symptoms are in large part due to an insufficient supply of blood to the sound-perceiving structures of the organ of hearing.

The occurrence of cases of otosclerosis paradoxica, moreover, affords a ray of hope in regard to the treatment of the disease, because it shows the possibility of improvement in the hearing, and indicates the direction in which investigations in regard to treatment might be carried out with some hope of success. This aspect of the subject is referred to more fully in the latter portion of this article.

The estimation of the upper tone limit has been in recent times the subject of an interesting investigation by Dederding. According to this investigator the upper tone limit is sometimes below normal in otosclerosis if the test is restricted to air-conducted notes, and the same appears to be true in the cases of deafness following the radical mastoid operation. But if the sound is conveyed by bone-conduction in these cases the upper tone limit is frequently found to be normal. The significance of this research is the influence which it has upon diagnosis. For it is clear that if reliance is placed upon the hearing of the high notes by bone-conduction only, then more cases will be put into the category of deafness due to the sound-conduction apparatus and fewer into that of defects in the sound-perceiving elements. The physiological explanation of this difference in the hearing for high notes when conducted by air and bone respectively is obscure, and it would be a waste of time to speculate upon it until further post-mortem examinations are made, when the pathological changes which are found may be correlated with the clinical observations.

PATHOLOGY

In respect to the pathology and pathogenesis of otosclerosis much valuable information has been gained by the work of a number of investigators. Nager has made a careful study of temporal bones which were affected, in common with other bones, in cases of osteogenesis imperfecta (fragilitas ossium), osteogenesis fibrosa and osteitis deformans (Paget's disease), and has proved that these conditions, especially osteogenesis imperfecta, show a considerable similarity to the changes found in otosclerosis in so far as the texture and structural change in the bone is concerned. I have, however, pointed out that the distribution of the bony change in the temporal bone is different in the two conditions. In otosclerosis the pathological change in the bone is, with comparatively rare exceptions, limited strictly to the immediate neighbourhood of the oval window including the stapes. And this is true even in cases in which the disease has existed for such long periods as twenty-five and sixty years. On the other hand, the changes in the temporal bone found in osteitis deformans, as investigated by Jenkins and by Nager, are found to extend over a much wider area, and, indeed, their potentiality for continual advance seems to be limited only by the extent of the bone. The same is true of osteogenesis imperfecta and osteogenesis fibrosa which have been described by Nager.

An interesting series of experiments has been carried out by Wittmaack in recent years. He ligatured the veins in the region of the foramen magnum in fowls, and thus brought about a stagnation of blood in the bone surrounding the labyrinth. After a few weeks the birds were killed and the temporal bones examined. It was then found that changes in the bone had taken place similar to, if not identical with, those which occur in otosclerosis. From this Wittmaack drew the conclusion that the characteristic osseous change in otosclerosis was the result of stagnation of blood in the bone. In this conclusion Wittmaack appears to be fully justified, and he is careful to point out that his experiments only show how the change in the bone comes about, but do not explain why the stagnation of the blood should occur in certain individuals and not in others.

In his examination of a number of cases of otosclerosis Otto Mayer found fissures in the temporal bone, and he is of opinion that these fissures occur in early life as a result of the pressure of growing bone on surrounding bone previously laid down, and he views the bony change of otosclerosis as a process of repair occurring in the neighbourhood of these fissures. It must appear to many pathologists that this explanation of the disease is rather difficult to accept. Indeed, according to some observers the fissures themselves are artefacts, and in any case it is not easy to understand how such changes could explain the clinical symptoms of the disease such as tinnitus, paracusis and the diminished secretion of wax in the meatus.

The relation of disease of the middle ear to otosclerosis has long served as a battle ground for the conflict of opinions. Fraser has examined a number of temporal bones in which septic processes were definitely present in the middle ear, and in a certain percentage of these the bone change characteristic of otosclerosis was present to an extent greater than could be accounted for by mere coincidence. He is careful to point out that this does not necessarily mean that otosclerosis is entirely the result of septic processes in the middle ear. He admits, on the other hand, that the tendency to otosclerosis must be present in the individual, but given this tendency then middle-ear sepsis may be looked upon as the exciting factor in the disease. It must, however, be remembered that the actual number of cases in which otosclerosis can be definitely associated with septic absorption from the middle ear is small, and conversely the number of cases of middle-ear sepsis in which no otosclerotic changes are found is large. Consequently it is justifiable to assume that the individual tendency towards the disease is a much stronger factor than septic absorption from the middle ear.

In the course of his investigations into the minute anatomy of the temporal bone, Gordon Wilson discovered the occasional presence of a small fissure or channel passing deeply into the bone in the region immediately in front of the oval window, and he attributes the occurrence of otosclerosis to the presence of this fissure. There is no doubt that this fissure has a real anatomical existence in some subjects, and is not an artefact. It is situated, moreover, in the region at which the bony change of otosclerosis first appears in the very great majority of cases, and, when present, would doubtless provide a suitable nidus for microorganisms with the consequent local irritation and the possibility of changes in the adjacent bone.

The similarity in appearance between the newly-formed bone found in otosclerosis and that observed in cases of osteogenesis fibrosa has led Nager to the view that the occurrence of otosclerosis is due to some disorder in the secretion of the parathyroid glands.

CHANGES OTHER THAN IN BONE

It will be observed that, in all these observations made, and explanations given, in regard to the etiology of otosclerosis, the attention of the investigators has been directed solely to the pathological changes found in the bone. Indeed, most of those who have made the researches appear to have assumed that these changes are the only ones that occur in the disease. But other changes are found in otosclerosis besides those in bone. I have shown that degenerative changes are present in the medullary sheath of the cochlear nerve, and I have found in a certain percentage of cases that fibrous changes occur in the muco-periosteum of the middle ear in the region of the oval window.

In this latter condition, moreover, the fibrous tissue frequently absorbs both the newly-formed otosclerotic bone and the normal bone of the crura of the stapes. Furthermore, I have pointed out that the bony change of otosclerosis, with its accompanying fixation of the stapes, cannot account for the clinical picture which the disease presents to the physician. Thus the tinnitus which is so frequently present, and in some cases causes the patient more distress than does the deafness, is quite unexplained by the fixation of the stapes. The same is true of the diminution of the secretion of wax and the lessened sensitiveness of the tympanic membrane and meatal walls. Even in regard to the deafness, the severity of this symptom bears little relationship either to the extent of the disease in the bone or the degree of fixation of the stapes.

The difficulty and, it may be added, also the fascination of the otosclerosis problem lie in the difference between the clinical picture as it really is and that which would be expected from the pathological changes which are found. The fixation of the stapes can account only for the deafness, and even in respect of this symptom it does not explain the improvement which the deafness undergoes in varying conditions, as when the patient hears better in a noise, or on the inhalation of amyl nitrite, or when there occurs a sudden redistribution of blood in the body. In these conditions the stapes remains fixed, but the deafness is strikingly improved and cannot, therefore, be entirely the result of immobilization of the bonelet.

The tinnitus which is usually, though not always, present in otosclerosis cannot be explained by the mechanical fixation of the stapes. It has been suggested by the writer that this symptom may possibly be due to the degenerative changes which he demonstrated in the medullary sheath of the cochlear nerve. But it is necessary that more cases should be examined post-mortem before this explanation can be definitely accepted.

PROGRESS OF CHANGES

Some interesting facts have recently been demonstrated in regard to the extent and rate of progress of the change in the bone characteristic of otosclerosis. In the majority of cases the area of bone affected is remarkably small.

In one case this area was only two or three millimetres in diameter and the stapes was only fixed at the tip of its anterior extremity. This limited area of diseased bone was symmetrical in both ears. In spite of this limited change in the bone, the patient was extremely deaf, and the deafness had lasted for twenty-five years. The tinnitus also was severe. In another case, even after sixty years of deafness the region of diseased bone was limited to the footplate of the stapes and an area of two or three millimetres in diameter in front of and behind the oval window.

THE VASOMOTOR FACTOR

The consideration of these clinical and pathological facts excludes the possibility that otosclerosis is a disease limited to bone; and the explanation of its occurrence must be looked for elsewhere. The temporary improvement in hearing in cases of otosclerosis paradoxica associated with the fact that a similar improvement occurs in many cases on the inhalation of amyl nitrite appears to indicate some defect in the vasomotor system of the organ of hearing as being the essential factor in the causation of the disease. The gradual failure of the vasomotor response which normally occurs when the organ of hearing is called upon to function, would slowly bring about a diminished activity in the functions of the various tissues and structures concerned because they would not then receive the extra supply of fresh oxygenated blood which they require when functionally active. Similarly, the changes in the bone can be explained by the stagnation of blood which, as Wittmaack has demonstrated by experiment, produces changes in the bony capsule of the labyrinth exactly similar to those found in otosclerosis. The changes in the medullary sheath of the cochlear nerve may be explained on the same ground, a deficiency in the supply of fresh oxygenated blood. It would appear, therefore, that in regard to the elucidation of the mystery of otosclerosis, and also, as will be shown later, in respect of the treatment of the disease, the chief hope of the future is along the lines just indicated.

TREATMENT

Turning to the treatment of otosclerosis it may be said in general that otologists are coming to agreement in respect to the futility of repeated inflation of the middle ear through the catheter. No doubt in a certain percentage of cases some improvement takes place, but the duration of such increase in the hearing power is very short. It cannot be due to a mobilization of the stapes, but probably depends on the temporary stimulation to the vasomotor nerves of the organ; and the same explanation holds true for the temporary improvement which frequently results from the passage of the Eustachian bougie. The various operative procedures upon the nose which were devised for the relief of otosclerosis have lost the glamour which they held for one or two decades. Their introduction was based upon a wrong conception of the pathology of the disease and consequently the results hoped for did not make their appearance, and otologists have for the most part given up these operations.

The treatment of otosclerosis by the method of re-education of the hearing, which was instituted many years ago by Natier, has been elaborated by Zünd-Burguet. The principle upon which this method is based, is that, by training the patient to concentrate the attention on listening to various notes and sounds produced by an instrument devised for the purpose, the sense of hearing becomes re-educated, and in the course of time the power of following conversation is improved. A certain small percentage of cases appear to benefit a little from this method of treatment, but in many no perceptible improvement results. It might, perhaps, be employed more frequently were the results commensurate with the time and expense involved.

A method of treatment has in the course of the present year been introduced by the writer. As a result of his clinical observation of the effect of the local application of thyroxine to the mucous membrane of the nose he was led to try its effects upon the ear in cases of otosclerosis. Briefly the method consists of the injection of a fine suspension of thyroxine into the middle ear by means of a hypodermic syringe with a long fine needle. In half of the fourteen cases treated, considerable improvement occurred. The procedure is easily carried out and is painless. It does not interfere in any way with the patient's ordinary activities and the treatment is not of long duration. It is applicable to patients under forty years of age or thereabout, but is not of much value in those over fifty. A remarkable feature of this treatment is that in those cases in which improvement occurs it lasts for a long period of time. In these cases many weeks and even months have elapsed since treatment ceased, but the improvement still remains.

This method of treatment is of such recent introduction that it is as yet too early to say if it will become included in the regular practice of otology. It should be added that its rationale depends upon the view that the changes which occur in otosclerosis are the result of a gradual failure of the vasomotor reflexes of the organ of hearing to which reference has been made in this article.

Surgical operations have been undertaken in recent years in the hope of relieving the symptoms of otosclerosis. These have for the most part been directed towards making an opening in the bony wall of the labyrinth to compensate for the firm closure of the oval window by the fixation of the stapes. Gunnar Holmgren, Fraser and Sourdille have all undertaken such operations. These procedures, however, have never gained an accepted position in otology, and have been given up in most instances, even by those who have tried them. They are not without danger, and even when improvement in the hearing has occurred it has been found to be temporary. In actual fact they have failed because they are based on a wrong conception of the pathology of the disease. The deafness of otosclerosis is only in part the result of fixation of the stapes, and may even be present when that bone is quite freely movable.

Another surgical procedure which has been devised for the relief of otosclerosis consists in the excision of the superior cervical sympathetic ganglion. This operation is based on a more rational principle than that just described, for it aims at bringing about a larger supply of blood to the organ of hearing, which should be the objective in any method of treatment of otosclerosis. A few cases have been recorded in which the hearing has improved considerably after the operation and the patient has also been relieved of the tinnitus. Unfortunately, however, little or no improvement has occurred in the majority of cases. Even when successful in improving the hearing, excision of the cervical sympathetic ganglion causes unpleasant symptoms affecting the eye and sweat glands in the region supplied by the nerves associated with the ganglion. This fact combined with the uncertainty of the results in respect to the hearing and the tinnitus have prevented the operation from becoming a recognized undertaking.

It may be said in general terms that in recent years our knowledge of otosclerosis has increased considerably in regard to its clinical study and greatly in respect to its pathology. The outlook in regard to treatment has never been so bright as it is now.

ACUTE SUPPURATIVE OTITIS MEDIA AND MASTOIDITIS:

SOME REMARKS ON DIAGNOSIS AND TREATMENT

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IN dealing with acute inflammatory diseases, whatever their site of origin, there is always likely to be a considerable diversity of opinion with regard to the question of active interference. When should surgical intervention take place, and what is the best method to employ in any particular case? Due consideration must be given to the situation of the primary infection, its vicinity to important and vital structures, and the likelihood or not of the condition becoming generalized. By far the most potent agent in combating any acute inflammation is the part played by the tissues and fluids of the body. Surgical interference may be called for, but ill-judged and untimely tampering with the processes of nature may increase the gravity of the condition and even lead to disaster.

As oto-laryngologists we may compare and contrast pyogenic infection as it is met with in the middle-ear spaces on the one hand and the nasal sinuses on the other. There is a good deal of similarity between the anatomy, physiology and pathology of these two regions. The middle-ear cleft includes the mastoid air cells, mastoid antrum, aditus, attic and tympanic cavity proper which communicates by means of the Eustachian tube with the naso-pharynx. The nasal sinus which most closely resembles the middle-ear cleft is the frontal sinus with its duct, the fronto-nasal canal opening into the nose. This canal when well developed may be likened to the Eustachian tube. The upper air-sinuses are, like the middle-ear spaces, closely related to the cranial contents and to large veins and venous sinuses. As in the case of the middle-ear cleft, the frontal sinus is frequently partially sub-divided, and it may be intimately associated with one or more of the ethmoidal cells—comparable to the cells of the mastoid process. The usual pathway of infection is, in the case of the nasal sinuses, *via* the nose; in the case of the ear, *via* the naso-pharynx. When suppuration occurs in the tympanum or middle ear proper, the tympanic membrane offers to the products of inflammation through its rupture or artificial incision, an early exit to the surface. By this means an alternative route is established for drainage, the other being *via* the Eustachian tube. No such alternative is present in the case of the nasal sinuses. Compared with the nasal sinuses, and again the frontal may be taken as an example, the middle-ear spaces suffer from the disadvantage that they offer an easy pathway for the spread of infection through the internal ear to the sub-arachnoid space, and therefore the menace of an intracranial complication, especially meningitis, is greater. It will be realized that when the seat of infection is in the tympanum the facilities for natural drainage are comparatively good; these facilities, however, are reduced when the mastoid antra and air cells are involved. Taking all things into consideration, however, it is difficult to understand why certain surgeons preach the gospel of interference, on comparatively major lines, at the earliest possible date in the case of acute middle-ear infections, and yet when the nasal sinuses are involved in a similar manner adopt a markedly conservative attitude.

Attention will here be confined to consideration of pyogenic infection of the middle-ear spaces. The different aspect presented by this disease as it affects on the one hand patients of the hospital class, and on the other those in good circumstances, must have struck every experienced observer. In the former overcrowding, insanitary surroundings, insufficient or improper food, lack of air and sunshine are the chief factors which are prejudicial to recovery. In these patients the disease is much more liable to spread to surrounding structures, and serious complications are comparatively common. It is in this class of patient, moreover, that delay in seeking medical advice is so common, earache or discharge from the ear being considered as happenings of little importance. All other considerations aside, it may be stated that, given two patients, one belonging to the poorer stratum of society, the other in prosperous circumstances, each presenting symptoms of similar type and severity, operative treatment, especially mastoidectomy, is much more likely to be called for in the former than in the latter.

The nature of the infecting organism is a most important factor, and the streptococcus, especially the hæmolytic variety, is responsible for the majority of serious cases. The *Pneumococcus mucosus*, however, is liable to cause an otitis media, mild in the early stages of the disease, and perhaps unaccompanied by otorrhœa; eventually symptoms, dramatic in their suddenness and severity, are likely to develop. A bacteriological report on the aural discharge may prove most helpful. Otitis media arising in cases of influenza is liable to be severe, and in certain epidemics a fulminating type of infection is met with demanding prompt surgical intervention. Serious cases calling for early interference may, however, arise in connection with the common cold. When symptoms of mastoiditis follow swimming and diving exercises, an operation on the mastoid is often necessary.

In considering diagnosis and treatment it is well to realize that an acute inflammatory process is seldom if ever confined to the tympanum. In nearly every case the mastoid antrum and not infrequently the mastoid air cells are early involved. It would therefore seem correct in most instances to employ the term tympano-mastoiditis instead of otitis media. The fact that in a given case there are no signs of extension to the mastoid does not mean that inflammation, or even suppuration, has not occurred in this region. The discovery of marked congestion of the mastoid and pus in the antum when these regions are opened up at operation does not necessarily prove that operative treatment was essential to recovery. Nature unaided apparently can, and often does, succeed in such a case.

METHODS OF INVESTIGATION

The methods which should be adopted when investigating a case of acute otitis media are as follows:—

First of all, before any examination of the affected region is undertaken, the patient's general condition should be carefully studied by an experienced practitioner or physician. In certain cases the opinion of a neurologist should be obtained. In many cases a leucocyte count should be carried out. Sometimes a blood culture should be made. An increased leucocyte count or the findings of organisms in the blood may call for prompt surgical interference. After a general examination has been carried out attention should be directed to the upper air-passages. A concomitant inflammation in the nasal accessory sinuses is often present, and may be partly responsible for the symptoms. Suppuration in the maxillary antrum, especially on the affected side, is not infrequently discovered. The following conditions are of importance :

Temperature.—It has been stated that a temperature of above 100° F. (except in children) generally indicates the presence of an intracranial complication. This may, to some extent, be true, but it is necessary to be certain that the ear condition, and not the the disease to which it is secondary (e.g. influenza) is responsible for the pyrexia. It may therefore be a mistake in the early stages of the illness to attach too much importance to the degree of fever. It must not be forgotten that an elevation of temperature is perhaps the first indication of a disease, such as pneumonia or one of the exanthemas, which has so far not given rise to other symptoms or signs. In all cases of children suddenly developing fever an aural examination should be carried out. It must not be taken for granted, however, that because there are sufficient changes in the ears to give rise to the pyrexia that these changes are the sole cause of the pyrexia. Sometimes otitis media develops without any rise of temperature. It is usual in cases which do not resolve for the temperature to rise concurrently with the extension of the disease. Rigors generally indicate that the infection has extended to the cranial cavity, and in the majority of cases they point to involvement of the venous system, generally the lateral sinus. This sinus, however, may be infected without the occurrence of rigors.

Pulse.—This as a rule follows the temperature. It will be remembered that in scarlet fever the pulse rate is usually out of proportion to the temperature.

Hearing.—Inflammation and abscess formation in the tympanic cavity naturally cause deafness which will vary according to the degree of obstruction to the passage of sound waves. The deafness, when the inflammatory process is limited to the middle ear, will give rise to increased perception in the diseased ear of a tuning fork held on the forehead. Deafness generally persists for some time after the discharge from the meatus has ceased. Absolute deafness points to involvement of the labyrinth.

Pain.—This varies much in intensity. In some cases it is agonizing; occasionally it is absent. Sometimes it is limited to the region of the affected ear, at other times it radiates backwards over the mastoid, or forwards and upwards to the side of the head. It is generally worse at night, and may give rise to insomnia. A throbbing sensation in the ear often accompanies the pain. In infants and young children pain may be indicated by restlessness and a tendency to pull at or rub the affected ear. The locality and type of the pain may indicate the direction of spread of the disease upwards towards the squama, inwards into the petrous pyramid, or it may point to an intracranial extension. If the otorrhœa is due to tuberculous infection rupture of the membrane may often occur without any preliminary pain.

Tenderness on pressure over the mastoid is a common occurrence and it must not be regarded as an indication for operation on the mastoid process. Increasing tenderness with a persisting or rising temperature accompanied by a free discharge from the ear, tenderness appearing ten days or so after the onset of the otitis media, or occurring coincident with a cessation of discharge is a pretty sure sign of suppuration in the mastoid process. Tenderness is generally most marked over the region of the mastoid antrum, but sometimes it is more readily elicited by pressure over the apex of the mastoid process. As the result of suppuration in cells posteriorly placed or in the lateral sinus groove, pressure applied from one to one-and-a-half inches behind the meatus may give rise to pain. In eliciting tenderness pressure must be directed at right angles to the bone, care being taken not to displace the auricle. When the zygomatic cells are involved firm pressure on the auricle just above the meatus or over the temporal muscle in front of the meatus may cause pain. At other times tenderness is present in the upper part of the neck just below the tip of the mastoid, a sign which may indicate, especially if swelling also is present, that pus has escaped into the neck (Bezold's mastoiditis). Other things being equal, the more cellular the mastoid process and the thinner the bone forming its cortical covering, the more likely are tenderness and swelling to be early signs.

Post-auricular swelling and displacement of the auricle.—Slight œdema over the mastoid is best recognized by applying firm pressure with the tip of the forefinger and keeping up this pressure for from 10 to 15 seconds. By this means if œdema is present, a shallow depression is produced which is best appreciated by gently passing the finger over the area. A moderate degree of œdema is fairly common and does not in itself indicate serious involvement of the mastoid; when, however, the swelling becomes marked and especially if fluctuation can be detected the case may be considered one of genuine mastoiditis. Increasing tumefaction causes the pinna to be pushed outwards and downwards; downward displacement does not occur in furunculosis. If a definite abscess has developed over the mastoid or in the neck, pressure over the swelling may cause pus to well up in the meatus; this sign indicates considerable destruction of the mastoid cortex. In zygomatic mastoiditis the swelling may be situated above or in front of the pinna. Pus when it collects appears underneath the temporal muscle giving rise among other signs to difficulty in opening the mouth. In rare instances pus tracks inwards, producing an abscess in the petrous or in the region of the pharynx. Occasionally a condition resembling furunculosis complicates an infection in the middle ear. In such a case diagnosis may be difficult and an erroneous impression may be obtained that a mastoid operation is necessary.

Discharge.—A copious blood-stained discharge is frequently observed in severe cases associated with influenza. An abundant purulent discharge which pulsates and which re-appears quickly after being mopped away generally indicates extensive disease in the mastoid. Sudden cessation of discharge associated with increasing mastoid tenderness also points to mastoiditis. Sometimes the meatus is partially filled with a mass of desquamated epithelium which is difficult to remove and which rapidly reaccumulates. This material interferes with drainage and proper inspection—therefore attempts should be made to remove it. In acute otitis media the discharge is rarely offensive, but if the acute condition represents a recrudescence of old ear trouble the pus is generally foul-smelling. Here it may be remarked that acute symptoms or signs developing in cases with a history of chronic suppuration nearly always point to the necessity for surgical interference.

Examination of the tympanic membrane and meatal wall.—Early in the disease an area of congestion is noticed which generally starts at the upper part of the membrane and spreads downwards. The whole membrane becomes bright red and eventually bulges. The congestion spreads to the posterior superior wall of the meatus making it difficult to differentiate between the drum and the meatus. This condition of the meatus must by no means be taken to indicate mastoiditis, but if in addition to the congestion there is definite sagging, genuine mastoiditis is probably established. Eventually the drum ruptures, generally at its posterior part. In rare instances swollen mucous membrane protrudes through the perforation and becoming very œdematous closely resembles an aural polypus. Recovery without operation when this has taken place is not unknown.

It is not within the scope of this article to enter into a discussion of the symptoms and signs pointing to the various possible complications and their treatment. Such conditions as paralysis of the 6th or 7th nerves, disturbance of equilibrium, not to mention the numerous phenomena which indicate involvement of the intracranial structures, call for very detailed investigation before embarking on operative treatment.

In cases of doubtful mastoiditis a certain amount of help can be obtained from a critical X-ray study of the temporal bone (mastoid, squamous and petrous elements), the healthy being compared with the diseased side. In a patient who is being kept under observation X-ray pictures taken at intervals of a few days may indicate progress towards recovery or the reverse. It must be remembered that the temporal bones are frequently asymmetrical, especially as regards the cellular development of the mastoid processes. The majority of patients, even when some signs of mastoiditis are present, can quite safely be kept under observation for a week or ten days, during which period recovery often takes place. Certain fulminating cases occur, especially those in which rapid spread to the meninges takes place. Many of these cases are beyond surgical aid.

TREATMENT

The patient should be kept in bed with an even room temperature, a suitable diet, which will vary according to circumstances, being ordered. The ordinary bodily functions require attention, and a purge should be administered at the commencement of the illness. A four-hourly chart should be kept. Generally, the tympanic membrane ruptures spontaneously, but if it is markedly red or bulging, if the patient complains of pain, if there is pyrexia, and without doubt if there are any signs present which give rise to anxiety, paracentesis should be carried out promptly. The operation is simple and requires a very short anæsthesia. A vertical incision should be made in the posterior part of the membrane and carried outwards for a short distance through the soft tissues lining the superior meatal wall. A wound which is inclined to close may be kept open by employing suction with the Siegle speculum. Sometimes paracentesis has to be repeated. Timely drainage of the tympanum by incision of the drum is probably one of the most useful operations in surgery, and if carried out more often the number of mastoid operations would be greatly reduced. Sometimes, after natural rupture or paracentesis, the otitis media persists. In not a few cases the otorrhœa will cease if attention is paid to such conditions as adenoids or nasal sinus disease. Improper blowing of the nose with the propulsion of infected material along the Eustachian tube is often responsible for persistence of the otitis media. The patient should be instructed to clear the nose by sniffing or to blow gently only one side of the nose at a time. A visit to the country or seaside may be quickly followed by a cessation of the discharge and the restoration of hearing.

It is often difficult to decide whether or not a mastoid operation is necessary. There are certain conditions already indicated where a mastoid operation is obviously called for. The tendency at present is to operate too early, and, with certain reservations, the principle might be adopted, "When in doubt don't operate." Nature, who is trying hard to erect barriers against a general invasion, is often not allowed time to complete her fortifications. The experienced otologist will as a rule be able to recognize cases in which the symptoms point definitely to the advisability of prompt intervention, or in which the condition is not likely to resolve unless the mastoid cells are opened up.

When it is decided that the mastoid operation is necessary, it should be thorough. The tympanum proper is left intact, but every accessible diseased cell should be opened up. This may mean an extensive operation. Sometimes it is advisable to expose the dura of the posterior or middle fossa, and not infrequently an unsuspected extradural abscess is discovered. No one should undertake these operations unless he has an intimate knowledge of the anatomy of the region, which is subject to great variations.

The post-aural wound should always be drained. When, in spite of treatment, a suppurative otitis media persists for from four to six weeks, it may be necessary to perform a mastoid operation. Each case must be considered on its merits. Delay in operating may result in permanent damage to hearing. It may be advisable to operate early in patients who are deaf in the other ear. It is astonishing how rapidly the hearing may recover after opening up the infected cells and establishing drainage.

THE CONSERVATIVE TREATMENT OF MIDDLE-EAR SUPPURATION

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THE problems which face a medical man in charge of a case of otitis media are many, and may occur at any stage of the disease. For the purpose of this article, however, it may be assumed that the initial stages are over, and that the ear is discharging, either through a natural perforation or through one made by paracentesis. The temperature may still be up, but in a favourable case should fall gradually, and at the end of from five to twenty-one days it should be normal, the ear free from pain, and the discharge be lessening, or have ceased. There should also be an entire absence of the original tenderness almost always to be found over the lower part of the mastoid during the first few days. On examination of the tympanic membrane the perforation will be healed or nearly healed and the hearing should be improving rapidly.

Unfortunately by no means every case takes this course. In some the temperature ceases to fall, and may even begin to rise again. Pain, which had gone, may recur, and become worse, and discharge may persist. With the recurrence of pain some tenderness to deep pressure may be found over the mastoid, indicating that the infected cells are not draining properly. At this stage the question of operation must naturally be considered, and here an expert opinion will be helpful if only in dividing the responsibility. Some authorities will deem it wise to operate at once, while others, knowing that such cases may still recover by conservative treatment, will advise watchful delay. It is here that treatment by suction may be very helpful.

A suction speculum is inserted in the meatus, making an air-tight fit. The rubber bulb is allowed to expand and pus will be seen to emerge through the perforation into the meatus. When the suction is relaxed this pus will be pushed back again by the restored air pressure and little good have been done, except possibly by the temporary increase of congestion (Bier's treatment). If, however, a pledget of sterile wool be passed deeply into the meatus before the suction is begun, some of the pus will be trapped. This wool can then be removed, replaced by a fresh piece and the process repeated until the wool is found to be practically dry. This treatment should be carried out by the practitioner himself once or twice daily and may serve to re-establish drainage and tide the patient over the crisis till the discharge, pain, tenderness and temperature all diminish and recovery ensues. At the end of each treatment the meatus should be partly filled with antiseptic drops and the suction reapplied without the wool. Bubbles will appear and, when the suction is stopped, the antiseptic will be forced back into the recesses of the ear and into the neighbouring parts of the mastoid.

COMPLICATIONS

By far the most frequent complication in the first week or ten days of a discharging ear is meningitis. After the discharge has become established the temperature often remains up, and pain may persist; the tissues have not yet developed their resistance. But this stage is usually of short duration, and need not cause anxiety unless the temperature actually rises, the degree of illness seems to increase and headache (as distinct from earache) becomes a feature. Meningitis should then be suspected, a lumbar puncture should be done, and further advice sought if the result is positive. In these relatively rare cases it may be admissible to open up the mastoid, even if the result is negative, as a precaution against spread of infection to the meninges, either by way of the labyrinth or the tegmen tympani.

In the later weeks vigilance must be used to observe the onset of any of the other well-known complications. Pain behind the ear and rise of temperature, with rigors, point to a lateral sinus thrombosis with detachment of septic fragments into the general circulation. An abundant discharge with headache may be an indication of an extra-dural abscess, or a profound headache with changes in the reflexes, in a patient who is obviously ill, may point to a temporo-sphenoidal abscess. Giddiness and nystagmus suggest a labyrinthitis or cerebellar abscess. Details of these conditions would be out of place in this article, but the appearance of such untoward symptoms is an urgent indication that the practitioner should seek special help.

If no signs of complications appear the treatment of the discharge should be continued for at least six weeks; but it is advisable to change the treatment from time to time, and not to hold slavishly to one method. Some of the possible methods of treatment, with the most useful drops, are outlined later on page 639.

ASSOCIATED CONDITIONS

In the meantime care must be taken to make sure that there is no parallel infection elsewhere which is maintaining the discharge. Two instances will make clear the importance of this point.

The first occurred some years ago. A child aged 9 had at the age of four a *radical* mastoid operation performed on the left ear. This had practically destroyed the hearing on that side. It had been done in Spain two days after the onset of earache and it was not possible to discover why such a severe operation should have been carried out and at such an early stage. The writer was asked to see the other ear in which an infection of a severe character had occurred, followed by a discharge with a continued temperature. The parents greatly feared that it might become necessary for a second mastoid operation to be done, which might make him permanently deaf in both ears. The onset of the otitis had been accompanied by a sore throat. The throat had cleared up, however, and there was no nasal discharge. After a month the necessity for a mastoid operation had to be discussed, but it was decided in the special circumstances to remove the tonsils and adenoids first, and this was done. Within a week the ear was dry and the perforation healing and so far as is known there has been no trouble since.

The second case was that of a woman aged 35 whose left ear had been discharging copiously for six weeks. The left antrum was discovered to be dull: it was washed out and proved to be full of pus. After the lavage the ear cleared up quickly. As the antrum refilled the discharge from the ear began again and again ceased after a second lavage. The antrum was therefore opened by operation and drained into the nose and the ear recovered completely.

This conjunction of an infected antrum and a discharging ear is not at all uncommon and should always be looked for, not only in adults, but also in children. In children, too, it is admissible to remove infected adenoids and tonsils before deciding to open the mastoid. Many mastoids have been opened quite unnecessarily for want of these precautions. It is, moreover, always advisable to combine treatment of the ear discharge, even from the earliest stages, with treatment of the nose. The head should be bent back over the edge of the bed, or with pillows under the shoulders, and a few drops instilled into the nostrils of flavine (1/1000), 5 per cent. or 10 per cent. argyrol, or of some antiseptic oil such as chloretone inhalant one part, liquid paraffin three parts. This will help to prevent constant reinfection of the ear from the Eustachian tubes.

LATER MANAGEMENT

After six weeks skiagrams should be taken of the two mastoids and carefully compared. Any sign of bone disease on the affected side—e.g. the breaking down of the bony lamellæ separating the cells—should be taken as a positive indication for operation on the mastoid. Further delay will probably be useless, and will only endanger the hearing, which is progressively likely to suffer from adhesions and the formation of fibrous tissue in the attic.

During the period of recovery, as the perforation heals, it is advisable to inflate the ear through the Eustachian tube every two or three days (though if a mastoid operation has been done it is better to wait until the aditus has granulated and so closed the communication between the middle ear and the wound). This will ensure that the hearing is maintained at as high a level as possible.

It sometimes happens that a case seems to recover completely in which there has been some anxiety as to whether or not a mastoid operation might have to be done. Later on, however, say in six months or a year, perhaps as the result of a cold or influenza, the ear may discharge again and continue to do so for a month or two. Here there is probably a residual focus in the mastoid process which remains latent until reawakened, and the process of recurrence may go on over a period of years. An interval skiagram may be helpful, but on clinical grounds alone it is advisable to open the mastoid as soon as the condition is recognized and so put the ear into a position of safety. The writer believes this to be true even if the skiagram, taken after a recovery, shows an apparently normal mastoid process. More commonly, of course, the skiagram shows some departure from the normal on the side involved.

CHRONIC DISCHARGES

So far this article has been concerned with cases which are acute or subacute. But many patients come to their medical man for advice about a discharge which has continued for months or years. They may have been rejected in some medical examination on this account, or the discharge may have become offensive. On inquiry it will be confessed that no treatment has been used, except possibly to wipe away excessive discharge with a piece of cotton wool or occasionally to instil some peroxide drops. Such an ear should be carefully syringed and any foreign body removed. Sometimes a piece of cotton wool may have been in the meatus for years. If a polypus is discovered the case should be sent to an otologist for further advice. He may decide to remove the polypus and keep the patient under careful observation in case an acute mastoiditis should be thereby provoked. This demands an immediate radical operation, in which the contents of the middle ear as well as the mastoid itself must be cleared out. Occasionally it has happened in the writer's experience that the fortunate removal of a polypus, together with its pedicle and the carious bone from which the polypus arose, has left the ear free from any further cause of suppuration, and after a short course of ordinary treatment the tympanum has become dry and, in a few cases, the perforation itself has healed. The same thing often applies to the removal of a foreign body. Far more commonly, however, the discharge will continue, and if after using the ordinary methods of treatment it refuses to dry up, there will be no alternative but to advise a radical operation, especially if the patient suffers from signs of septic absorption.

In some cases of bilateral discharge with poor hearing the patient will say that he hears much better when the discharge is present than when the ear has been dried or become dry naturally. This raises an awkward point, and perhaps the best way out is a radical mastoid on the side with the worse hearing and a conservative operation on the other. This leaves the middle ear untouched on the good side and the patient may be given some glycerine and carbolic drops to use for hearing purposes as well as to keep the ear clean. It is also advisable on the other side to try the effect of an artificial tympanic membrane. This consists in a tiny piece of wool soaked in thin liquid paraffin containing a small amount of carbolic acid or menthol (e.g. 0·5 per cent.), which is passed down so as to lie on the inner tympanic wall. The patient himself can easily learn to apply this daily if it is found to assist the hearing.

Frequently the cause of the chronic discharge is disease, not of the mastoid process (which is usually so sclerosed as to be practically solid), but of the ossicles—especially the incus—and the operation of ossiculectomy (removal of the ossicles) may bring about a cure without the necessity of operation on the mastoid. This operation is now seldom performed, but it might well be done more often, as if it fails the radical operation is still in reserve and can be done. When there is an abundant discharge the mastoid process is probably involved. These cases, as well as those in which a cholesteatoma is suspected, should be sent to an expert otologist.

In patients of middle age and in good health, a moist perforation with occasional exacerbations of discharge may perhaps be left to conservative treatment without operation, provided that the patient is under observation.

It is a safe rule that no radical or conservative mastoid operation should be done until all collateral sepsis has been excluded or dealt with as completely as possible, except in cases of emergency.

Another type of case in which the discharge may be regarded as almost chronic is that in which a posterior (Schwartze's) mastoid operation has been done and healing has not taken place completely. There is a persistent sinus which discharges pus and, no matter what form of antiseptic treatment is adopted, the sinus refuses to heal. The main causes are three: (1) Failure of the aditus to close; (2) presence of a sequestrum; and (3) failure at the original operation to clear out all the cells. The aditus is particularly prone to remain open when the discharge is mucoid in character (and contains *Streptococcus mucosus*) and the tympanic cavity has failed to clear up as a result of the operation. A vaccine will sometimes help and in one or two such cases the writer has seen an almost dramatic improvement following its use. Particular attention should be paid to the middle ear and the suction method of treatment previously described may be of great use, as by its means an antiseptic may be introduced actually into the tympanic cavity. If the perforation in the membrane has healed, suction must be applied to the opening in the aditus itself or to the lips of the sinus, and 10 per cent. argyrol is a particularly suitable reagent. Sequestra may gradually " work out " in the course of time, and their appearance in the discharge may herald the healing of the wound. Persisting cells will sometimes become clean enough to allow the healing of the wound, but may lead later on to a recurrence of suppuration in the wound and the formation of pus under the scar. In all these cases it may become necessary to do the operation again.

TUBERCULOSIS

An intractable thin discharge, possibly blood-stained, following an otitis of acute or insidious origin, may be due to tuberculous infection of the middle ear. Tuberculous otitis media is especially liable to attack the bony walls and contents of the tympanum, leading to facial palsy. A common feature also is a marked enlargement of the group of glands behind, below and in front of the lower part of the pinna. This combination of enlarged glands and facial palsy is always strongly suggestive of tubercle, and the discharge should be sent for examination to a bacteriologist. The treatment which is most uniformly successful is a radical mastoid operation, with or without a removal of glands, followed by a prolonged visit to Margate with open-air treatment. Though it is often stated that in tuberculous otitis the origin is insidious and the tympanic perforations multiple, the origin may simulate that of an ordinary acute pyogenic attack, and the perforation be single. Active treatment must be undertaken as soon as the diagnosis is made, because this infection is especially prone to a fatal extension to the meninges.

A peculiarity of infection by pneumococcus type III (or *Streptococcus mucosus*) is that it may spread to the meninges and end fatally even some weeks after the tympanic condition has cleared up, but the writer has never actually seen a delayed case of this kind.

DRY PERFORATION

The care of a dry perforation is a point of great importance to both patient and practitioner. Such an ear must never be syringed (e.g. for wax) unless an antiseptic lotion is used (e.g. 1 in 60 or 1 in 80 carbolic acid). The entry into the middle ear of water already infected or carrying organisms from the meatus is liable to be followed by a discharge, which may prove intractable.

Some years ago I syringed with warm water a meatus blocked completely by wax and found, when the wax was removed, that the tympanic membrane contained an old-standing perforation. Drops of glycerine and carbolic acid were instilled at once, but nevertheless a copious discharge occurred shortly afterwards, which persisted for over a year in spite of active treatment.

Hence when syringing an ear of which the history is not known, it is always essential to use an actively antiseptic solution. Patients with a dry perforation should be warned most carefully never to allow water to enter the meatus either when bathing at home or in swimming baths or even in the sea. A plug of vaselined cotton wool should always be placed in the ear first. There is the further danger that the entry of cold water into the middle ear through a large perforation may set up convection currents in the semicircular canals and so cause an attack of vertigo which, in deep water, may place the swimmer in jeopardy.

METHODS OF TREATMENT

It remains finally to consider the actual methods which may be employed in the conservative treatment of middle-ear suppuration. The primary considerations are: (1) To prevent the original infection due to a single organism from becoming a multiple infection by the addition of outside organisms such as staphylococci. (The great majority of primary infections are streptococcal.) (2) To keep the meatus clean and prevent the accumulation of discharge. (3) Watchful care in looking out for complications, which entails keeping a record of the temperature and seeing the patient at frequent intervals.

Perhaps the surest way to fail in the first of the three points is to allow a nurse or mother to confine the treatment to periodic moppings with wool mops made by dirty fingers from an unsterilized (or even a sterilized) roll of wool. The covering of the ear with a sterile gauze pad in such cases has no other virtue than to keep the pillow clean.

Under the second head, the relative advantages of mopping and syringing must be considered. I personally favour syringing when the discharge is abundant, and especially if it is mucoid. Preliminary instillation of peroxide of hydrogen drops (10 vols. per cent.) will make it easier to dislodge a sticky discharge, and, as a lotion, a solution of boracic acid has stood the test of time and is most satisfactory and cheap. The strength is immaterial, provided it is more than half saturated. Excess of lotion should be allowed to run out from the ear, and afterwards drops of 2·5 per cent. carbolic acid in 40 per cent. to 75 per cent. glycerine may be instilled, though this is not essential. A pad of sterile gauze and wool is then applied, and the treatment carried out four-hourly. It is not easy for organisms to force such a barrier continually maintained. For use by the mother, the safest syringe is the Fergusson (Mayer and Phelps), which has a means of preventing distension of the meatus and tympanum by assuring a separate return flow. The ordinary glass syringe with its cotton-wound piston is as a rule inefficient. A useful syringe can be made by using in combination (i) a Eustachian catheter, held at the entrance to the meatus, and steadied by placing the hand against the side of the patient's head, and (ii) a 2 to 4 oz. rubber syringe with a soft rubber nozzle which just fits the expanded end of the catheter and makes a practically water-proof joint.

When the pus is mucoid in character the addition of bicarbonate of sodium to the boric acid in equal quantity is helpful, as the basis of the lotion.

As the discharge diminishes in amount the meatus may be mopped after syringing or the fluid allowed to run out and a powder blown in, either from an insufflator or a glass tube. Boracic powder by itself is excellent or it may have 2½ grains of iodine incorporated into each ounce, for obstinate cases. The iodine is first dissolved in spirit and the solution made into a paste with boracic powder, which is then allowed to dry.

Drops may be used instead of the powder, and if the suction method described above be employed they can be made to penetrate the tympanic cavity. Perhaps the most generally useful are flavine or acriflavine (1/1000), 10 per cent. argyrol, mercurochrome (0·5 per cent., aqueous), dettol 3 per cent., and carbolic acid in glycerine. Glycerine may be used with flavine or mercurochrome if it is desired to produce an osmotic effect, up to a proportion of 25 per cent. or 50 per cent. Mercurochrome has been found to clear up a few cases which have resisted all other treatment, and is most valuable.

In the later stages, when the discharge has become thin and scanty, spirit drops are often helpful. This applies especially to chronic cases. A useful formula is the following:—

℞	Boracic acid - - - -	10 grains.
	Rectified spirit - - - -	180 to 360 minims.
	Distilled water - - - -	to 1 ounce.

For chronic cases ionization by zinc sulphate is useful, but is best applied by an expert. In such hands, e.g. in a school clinic, this method has yielded striking results. But whatever method of treatment be adopted, much depends on the efficiency with which it is carried out. This can be best illustrated by the well-known fact that children's ears, which have resisted home treatment for months, often clear up in hospital under identical treatment correctly applied.

In conclusion it must be made clear that this article is intended only for those who have not had any special experience in otology. It represents the results of twenty years' experience, but is necessarily incomplete. It is hoped that those in general practice may find it a useful guide until their own accumulated experience enables them to pick their way safely between the pitfalls which beset their path in the treatment of aural suppuration.

HEARING AIDS

BY PHYLLIS M. TOOKEY KERRIDGE, M.SC., PH.D., M.R.C.S. L.R.C.P.

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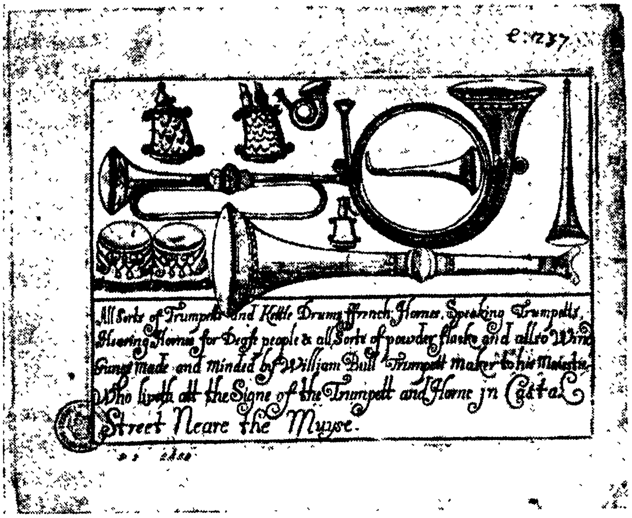
IT is no new discovery that the magnification of sounds can compensate for defective hearing. The interesting question is whether this magnification can be done more easily and efficiently by an instrument than by raising the voice or reducing the distance between speaker and listener. Experience with trumpets, hunting horns and whispering galleries taught men long ago that tubes of air, of suitable shape, could not only conduct sounds economically, but also magnify them in transit by resonance. From this it was an easy step to making horns and speaking tubes for the deaf, and such instruments have been in use for hundreds of years. The trade card of William Bull (fig. 1), a famous trumpeter attached to "The



All Sorts of Trumpetts and Kettle Drums ffrench Hornes, Speaking Trumpetts, Hearing Hornes for Deafe people & all Sorts of powder flasks and allso Wind Guns Made and Minded by William Bull Trumpett maker to his Maiestie Who liveth att the Signe of the Trumpett and Horne in Castle Street Neare the Muse.

FIG. 1.—The trade card of William Bull, 1666. *From the Banks collection, British Museum.*

King's Musick" in 1666, was worded as follows:—

> "All Sorts of Trumpetts and Kettle Drums, ffrench Hornes, Speaking Trumpetts, Hearing Hornes for Deafe people & all sorts of powder flasks and allso Wind Gunes made and minded by William Bull Trumpett Maker to his Maiestie—Who liveth att the Signe of the Trumpett and Horne in Castal Street Neare the Muyse."

Alexander Graham Bell had a deaf mother. After having been educated at Edinburgh and University College, London, he left this country for America, and became there a professional teacher of the deaf. He married a deaf wife, and spent his spare time trying to make apparatus to help the deaf to hear. It was for this purpose that he eventually evolved the telephone, which has proved since of such enormous value. Here is an account of the introduction of the instrument to the world for the first time in 1876, as told to some deaf school children whom he visited in later years:—

> "I had thought it possible to invent an electrical instrument that would do for the deaf what nature had failed to do for them; in other words a machine that would hear for them. . . . I hit upon a plan . . . but," he added, "this device, like several others I made, was what the world calls a failure. But from this failure sprang the telephone, that is now known and in use all over the world." Dr. Bell also recorded how he came to exhibit his invention at the Philadelphia Centennial in 1876, which exhibition led to its success. . . . "When we reached that portion of the building in which my invention was placed, I gave the Emperor [of Brazil] the receiver and told him to hold it to his ear. I went then to another part of the building and spoke to him through the transmitter. He started back with an expression of wonder on his face, and exclaimed, 'My God, it speaks!' From that moment," added Dr. Bell, "the telephone was a success." (From the *Arkansas Optic*, 1895, reprinted by the *Nebraska Journal*, 1934.)

His invention is the basis of the commonest form of electrical hearing aid on the market at the present time, although disguised under many patent names.

The last twenty years have brought rapid advances in electrical technique, accompanying the development of broadcasting and wireless transmission and reception. A corollary has been the introduction of the newest form of electrical aid for the deaf, employing radio valves as amplifiers.

Thus arose the three types of hearing aid now in use, which can be summarized as follows :—

1. Collectors and resonators (non-electrical, including horns, speaking tubes, auricles). 2. Micro-telephones. 3. Valve amplifiers.

Bone-conduction aids do not form a separate class of instrument. They merely employ a different kind of receiver, which can be used with any of the above types.

It would be convenient if deafness could be divided into classes which corresponded directly with the types of instruments. Unfortunately this is not the case, as their characteristics do not run on parallel lines. Generally speaking it has been found to be more helpful to consider the physical characteristics of deafness than its pathology for the purpose of fitting aids. This is probably due to the fact that the same pathological process may cause lesions in both middle and inner ear, and consequent damage in both the conduction and the reception of sounds. This is especially true of infections starting in the middle ear, so that a history of discharging ears is little guide to the end result, either pathologically or physically. It would be helpful to know the amount of hearing of every deaf person in each part of the auditory scale. This information is easily obtained given a co-operative patient, a quiet room, and a set of calibrated tuning forks, or better still, a pure tone audiometer. But these are still luxuries, and therefore they will not be dealt with at great length. Nevertheless, they have been of such service to investigations on the application of hearing aids that they deserve some attention. It would have been impossible to formulate such rough guiding rules as will be given later without the help of accurate measurements on a number of cases.

INVESTIGATION OF HEARING

The pure tone audiometer is an electrical instrument which generates in turn a number of notes of various pitches without any complicating harmonics. The loudness of each note can be adjusted, and a reading taken at the point when it can no longer be heard. The apparatus is complicated, heavy and expensive; but testing with it is so easy that reliable results of both air and bone conduction can be obtained even from young deaf-mute children. The rate of fading of the note can be adjusted to suit the temperament of the patient, slowed for the cautious or hurried for the bored. The loudness of a note can be kept constant at any time of doubt, or the note may be unobtrusively switched off suddenly to test good faith. The results are usually expressed graphically as an " audiogram." The same results can be obtained with calibrated tuning forks, which are both lighter and cheaper, have no upkeep, and no elaborate mechanism to go wrong. But accurate testing with tuning forks is an ordeal both for doctor and patient, whereas testing with an audiometer is like playing a game.

Hearing loss is conveniently expressed in decibel units. The ear, like other special senses, " thinks " approximately in multiples of ten. If one noise has a physical intensity 100 times as great as another, the ear considers it to be about twice as loud; if the physical intensity ratios are 1000 to 1 the ear perceives it as about three times as loud, and so on. The difference in loudness levels in the above examples can also be expressed as 2 and 3 bels, or 20 and 30 decibels, respectively, out of compliment to Graham Bell. The softest sound at a number of pitches which could be heard by a number of adults without ear disease was determined in America, and the average from this data serves as a zero line from which to assess the degree of hearing loss of deaf persons.

The following table gives some everyday loudness levels in terms of decibels :—

TABLE I

EVERYDAY NOISES	DECIBELS ABOVE THRESHOLD OF AUDIBILITY
	approx.
Country " quiet " - - - - - - -	10
Adventitious noise in an ordinary room - -	20–30
Adventitious noise in a noisy room - - -	40
Busy traffic noise - - - - - - -	70
Sound of a full orchestra playing *ff* - - -	80
Noise of an aeroplane engine at 10 ft. distance -	100
Ordinary voice at 12 ft. distance in a quiet place -	40
,, ,, 4 ft. ,, ,, ,, -	50
,, ,, 1 ft. ,, ,, ,, -	60
Loud voice at 2 ft. ,, ,, ,, -	70
,, ,, 8 in. ,, ,, ,, -	80
,, ,, 2 in. ,, ,, ,, -	90

The next table gives some common pitch (or frequency) figures which may help the imagination along the abscissæ of an audiogram :—

TABLE II

SOUND OR RANGE	PITCH (FREQUENCY)
Average range of auditory perception -	16–20,000 cycles per second (10 octaves)
Lowest note used in music (64 ft. organ pipe).	16 cycles per second
Middle C of piano - - - - -	256 ,, ,,
Highest note used in music, apart from overtones (top note of piccolo).	4,800 ,, ,,
Highest note used in music, including overtones.	10,000 ,, ,, (approx.)
Range used in speech - - - -	200–6,000 ,, ,,
Range used most in speech - - -	500–2,000 ,, ,,

A convenient figure to express the deafness of a patient with regard to speech is to average the hearing loss over the range 500–2,000 cycles per second. This may be referred to loosely as the hearing loss for speech frequencies.

The following table gives very roughly patients' estimates of deafness in terms of their hearing loss for speech frequencies in decibels :—

TABLE III

Practical estimation of deafness	Hearing loss for speech frequencies
	Decibels approx.
Difficulty in hearing when tired or inattentive, or in distant theatre seats.	30
Difficulty in hearing in noise of general conversation	40
Difficulty in hearing in everyday life, except in individual conversations.	50
Considerable difficulty in all conversation, unless voices are raised, or distances small.	60
Great difficulty unless spoken to close in ear - -	70
Extreme difficulty in hearing : if born as deaf, would not learn speech spontaneously.	80
Completely deaf - - - - - - - -	120

Few people notice that they are deaf until their hearing loss is as much as 30 decibels. When the loss for the middle speech frequencies amounts to this, the loss for high tones may be much more. This is especially true in the deafness of old age. This may have been noticed earlier by the patient as an inability to hear bats or bells, but rarely brings him to his doctor. I have analysed the audiograms of 1,000 people who had inquired of a commercial firm for an instrumental aid; 76 per cent. of them had a hearing loss in the speech frequencies between 45 and 70 decibels in their better ear, 52 per cent. of the total number had most loss in the high tones, 38 per cent. most in the middle, 5 per cent. had approximately uniform loss, and 5 per cent. had more loss in the low tones than elsewhere. These figures give some indication of the physical characteristics of the deafness of those who seek help. There is surprisingly little data in the scientific literature about how deaf the deaf are.

The shape of an audiogram is less easy to guess without actual measurement, but there are a few probabilities which may be of service if measurement is impracticable. The deafness of old age is almost always greater for the high tones than the rest of the range. Judging from data collected from deaf children, deafness caused originally by middle-ear disease stands about equal chances of being a middle-tone maximum or high-tone maximum type. Congenital deafness is often maximum in the high tones, or hearing may exist in small amount over a limited range, which may or may not be in the region used in speech.

INSTRUMENTS AVAILABLE

It is now opportune to return to the instruments and to consider to what extent they can be fitted in with the deafness. The non-electrical aids only magnify by about 15 decibels, and this in the region near 4,000 cycles per second. They will, for example, raise the level of a 40 db. noise to 55 db., thus making it audible to a person with a 50 db. loss. This may not sound much, but in practice has real value. But it will magnify the room noise as well as the voice, a point which is sometimes forgotten. Moreover, a conversation at a comfortable loudness to the speaker, say at 50 db. above threshold, conveyed by speaking tube to within an inch of the patient's ear, will be equivalent to 85 decibels even without magnification, and so can reach the extremely deaf. The tone of these instruments is more natural than that of the electrical instruments, particularly that of the microtelephones. But it is not a perfectly faithful reproduction, as the material and the shape influence the harmonics (or overtones) and cause differences between one and another, just as exist between a toy horn and a Bach trumpet. Given a patient who can be helped with a non-electrical aid, usually one with a hearing loss not greater than 60 db. for a horn or auricle, and 80 db. for a speaking tube, the decision whether or not he will use it is nearly always made on psychological grounds. The public does not yet treat a hearing aid with the same indifference as a pair of spectacles, and the deaf are often very self-conscious. This is particularly true of men, who have less opportunity of camouflaging an auricle in their hair. On the other hand, some people favour this kind of instrument as it has no batteries or wires to cause worry.

It is with the micro-telephonic type of instrument that the most careful consideration of the interaction of instrument and the type of deafness is required. These aids magnify most in the middle of the auditory scale, and are therefore more suitable to the middle-tone-maximum loss group than any other. This is the reason for the disgust felt by so many of the elderly high-tone deaf, who have tried these and condemned all electrical instruments on their account. They hear with them, but not intelligibly. Micro-telephones can be safely recommended to the middle-tone-maximum group, and may be tried by the others. Some of the latter do like them, if the slope of their hearing curve is not too steep, or their taste not too critical, but they should be prepared for disappointment. The timbre of the speech heard through the micro-telephones differs very much from one make to another, but is "mechanical" even in the best. Patients differ very much in the extent to which they dislike this. It is probably a question of the development of their critical auditory faculty, as well as their type of deafness. Most of the electrical aids on the market are micro-telephones, and numerous examples of them can be seen at any medical exhibition.

The valve amplifier aids give greater magnification, better tone and more adaptability and stability than the micro-telephones. Their chief disadvantage is their size. Progress is being made rapidly in this group, and the smallest apparatus on the market at the moment looks like a box camera. It is the deaf persons with losses between 60 and 80 decibels who appreciate this type most, especially if they have maximum deafness in the high notes. The less deaf will rarely bother with the bulk. Those who are deaf enough to be handicapped in life, rather than inconvenienced, usually regard portable valve amplifier aids as a real blessing. The limit of smallness is determined at present more by the size of the batteries than the amplifier. Small batteries have to be recharged at inconveniently frequent intervals, and do not hold their charge well. Although research may at any time bring the solution to this obstacle, it may be pointed out that a similar difficulty has prevented for a long time electrically driven motor-cars from being a practical proposition for anything except short-distance runs. Large valve amplifier installations can be made in church, school, home or cinema, and are also a great comfort to the deaf. One set on the market is a table model of a wireless set, in which the broadcast programme can be relayed extra loudly through a pair of headphones for the benefit of the deaf member of the family, or by turning a switch, the instrument can be used to pick up and magnify the speech in the room instead. It is fitted with a tone-control, so that more magnification can be given to the high than the low notes if required. It is powerful enough to reach anybody who has any remnant of hearing at all, and is valuable for the instruction of deaf mutes.

To summarize, it may be said that horns and auricles help those who experience considerable difficulty in ordinary conversation, and speaking tubes those with extreme difficulty. Micro-telephones cover about the same range of deafness. Their timbre is more mechanical, but the instruments are more easily hidden from view. They are not usually suitable for the elderly deaf. Valve amplifiers suit a wide range of deafness, but at present these instruments are bigger than the others. There is no personal instrument yet which is satisfactory for those who are so slightly deaf that they only experience difficulty with distant speech, as at the theatre. Any sound-magnifying device which they can carry picks up and enlarges the near noises of rustling clothes or programme turning to a troublesome extent. This objection does not apply to buildings which are specially wired so that the microphones are near the source of sound, and only the earpieces are in the auditorium.

A special word must be said about deaf aids in relation to deaf-mute children. Reference to the third table will show that there is a large gap between the degree of deafness at which speech will not be heard, and therefore not acquired naturally (80 db.), and complete deafness (120 db.). Deaf mutes are of varying degrees between these limits, few being completely deaf. A pure tone audiometer is of incalculable value in determining what residues of hearing these children have. It is not usually possible to do more than guess with infants, but a reliable curve may be obtained from most children of seven, and from some intelligent children of five and six. Teachers of the deaf have long realized that the slightest trace of residual hearing was of value to the acquisition of speech of natural tone, and have used close individual tuition, and speaking tubes, when opportunity occurred. The introduction of amplifiers into the class-rooms of the deaf is bringing about a revolution in deaf education.

Experience in this country is still young in this matter. It is certain that a new world is opening to a great many deaf children, although only time will show how far the smaller scraps of hearing will be of real service. It is one thing to hear, and another to appreciate the significance of what one hears. The teachers of the deaf are alive to the thrills and the problems of the new weapon which science has put into their hands. Speech education is still a slow process, needing skill and patience. But in the meantime children who have heard nothing from the outside world before are already, with the aid of amplifiers, listening to music and having fun calling each other names, trying to imitate their headmaster's manly cough, and listening exultantly to the bark of a dog or the "popping" of a motor bicycle! The medical profession should see that any deaf-mute children encountered should have the benefit of special education as early as possible, and as much individual attention as their parents' means allows. Most schools for the deaf take children from the age of three.

CHOOSING A HEARING AID

This article would not be a practical contribution on the subject of hearing aids if mention were not made of the present position in the commercial world as regards these instruments. The public learns, or thinks it learns, about hearing aids from advertisements. Some of these are pure frauds, particularly those concerning invisible instruments without works. The fee asked for home trial is sometimes much more than the value of the apparatus. Even apart from the frauds, most hearing aids are sold more like patent medicines than scientific products. The development of the subject has come from without the medical profession, and is sufficiently technical to have been left outside, to the misfortune of the patient. It will never be possible to prevent people who have an incorrigible love of the unorthodox from dealing with quacks of all descriptions; but an attempt should be made to protect the poor and credulous who believe that anything in print must be true, and also to provide a reliable source of information for the serious inquirer. The position would be simpler if all the instruments of which extravagant claims are made were valueless, but this is not the case. Many of them are quite scientific in principle, and some good in detail, but most are sold without discrimination. Hearing testing, which is often carried out by the same firms, could be carried out by them well and honestly, but it is the exception to find this done.

An acquaintance of mine recently accompanied his deaf mother to the London showrooms of two of the firms best known by advertisement, for advice about a hearing aid. In both places her hearing was tested by similar methods. One firm told her that her bone conduction was good and her air conduction very bad, and that if ever she used anything but a bone conduction aid she would very soon go completely deaf. The other firm said that her air conduction was excellent but her bone conduction very poor, and that the use of a bone conduction aid would soon result in the loss of all hearing. At this stage the poor lady became alarmed and, returning home, rang up her general practitioner to know which was true. I wonder how many practitioners would have known what to say?

Most of the micro-telephones on sale in this country are manufactured in Germany or America, but a minority are made here. Only a few makes are reliable as regards individual instruments, even when sound in principle. The usual practice of otologists up to the present seems to have been to indicate to the patient a reliable maker or agent, and to advise him not to purchase any instrument without an adequate home trial. The National Institute for the Deaf has also attempted to deal with the unsatisfactory situation. Cases of fraud or misrepresentation by any firm which are brought to their notice are often taken up legally on their advice with almost invariable success, most cases being now settled out of court.

Further, the Institute keeps a list of approved dealers. Subscribers to the list undertake as follows:—

1. That the most suitable aid indicated by the conditions of the client, whether electrical or mechanical, will be recommended: and that if no aid appears likely to help, the client will be duly informed.

2. That in the event of the purchaser being dissatisfied with the hearing aid supplied and requesting the return of the amount paid this will be refunded, less a sum not exceeding 10*s*. 6*d*. for expenses, provided that the instrument or appliance is returned within three weeks in good order and condition.

3. That no personal interview with a client at his own home will be sought unless at the request of such client.

A new list of conditions is under consideration containing a clause dealing with exaggerated advertisement, and also arranging that the trial fee shall bear a fixed percentage relation to the cost of the instrument. In considering applications for admission to their list of firms recommended to the deaf, the Committee of the National Institute for the Deaf take into consideration the nature of the advertising matter issued and the general methods of business practised in dealing with the deaf, by the firm or dealer making the application. The National Institute for the Deaf reserves the right to remove from their list the name of any firm failing to carry out the above conditions, but accepts no responsibility whatever in this matter beyond advising deaf persons as to the firms who have satisfied the Committee in the manner described in the above conditions. Practitioners can help the Institute and the honest part of the trade very materially by reporting any case which comes to their notice of firms on the list not keeping their obligations. A copy of the list can be obtained from the Secretary, 105, Gower Street, London, W.C.1, on receipt of a stamp for postage.

The following advice might be given to a patient going to see one of these dealers to try an aid:—

1. Take a friend with you, and listen to a voice you know as well

as to that of the demonstrator.

2. Move about with the instrument on.
3. Switch the battery on—if it is an electrical aid—and listen when nobody is speaking, both when you are sitting down and moving.
4. Try more than one make of instrument of the type you favour.
5. See that the ear-piece fits really comfortably. They can easily be adjusted to individual requirements.
6. Try a large ear-piece as well as a small one.
7. Insist on a home trial without obligation to purchase.
8. When at home listen to general as well as to individual conversation.
9. See how long the battery (if any) lasts, and calculate the cost of upkeep.
10. Do not wear a new instrument for too long at first. You will probably make your ears tired, and therefore seem more deaf.
11. If, after trial of an instrument, you can hear satisfactorily with it and procure one, and subsequently cease to be able to hear with it, or if adventitious noises develop, do not conclude that you are getting deafer or that the instrument is no good. Send it to be overhauled. A simple repair or renewal is probably all that is necessary.

Personally, I do not feel the problem is even then ideally dealt with. Few people are cool-headed enough to make a proper choice in the presence of an expert salesman, and it is not practicable to take a great many instruments home on approval. I should like to see more precise advice given by the medical profession, for it is an exaggeration to say, as some do, that only the patient can tell what will suit him. Some help could surely be given at least in connection with the special departments of hospitals. A small collection of typical instruments available for a properly conducted trial in a non-commercial atmosphere, in charge of someone who understands their principles and who has available the full particulars of the case, would save many pounds for those who can least afford to spare them. Medical students could assist in the testing and so assist themselves in future years.

Deaf persons want help to hear. They are obtaining it in a very muddled manner, and unscrupulous persons are profiteering out of the chaos. It is time the subject was given the place that is its due in medical science.

FAVOURITE PRESCRIPTIONS

NO. XI.—THE PHARMACOPŒIAS OF THE LONDON THROAT, NOSE AND EAR HOSPITALS

By DAN McKENZIE, M.D., F.R.C.S.E.
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IN this article the remedies of general medicine will be omitted from consideration in order to deal exclusively with special formulæ. For this purpose the principal authorities are two separate publications, the more senior from the Throat Hospital, Golden Square, first compiled by Morell Mackenzie something like sixty years ago, being now in its eighth edition, and the other representing the repertory of the Central London Throat and Ear Hospital. The third throat, nose and ear hospital in London, the Metropolitan, has never published its pharmacopœia, which exists in typescript only, and the Royal Ear Hospital has been amalgamated for some years with University College Hospital, with the pharmacopœia of which hospital its own is incorporated.

In running the eye over the three or four hundred prescriptions that form these pharmacopœias, one may be struck here and there by the long-continued popularity of certain combinations on the one hand, and, on the other, by the occasional appearance of what looks suspiciously like "dead wood" to the modern observer. As a matter of fact, every hospital pharmacopœia contains ancient and even antiquated formulæ at which the junior out-patient physician may be inclined to scoff. A little experience will soon teach him, however, to have more respect for old-fashioned remedies, since they continue to be the hope, stay and comfort of many a grateful patient.

A comparison of the two oto-laryngological pharmacopœias is interesting and in some respects rather amusing. How is the curious fact to be explained, for example, that Golden Square offers a choice of *trochisci* or sweetmeats, the preparation of which is detailed with the most careful precision, in no fewer than fifteen different varieties, while the (apparently more austere) Central London Hospital limits its patients to four only? If this indicates the presence of "dead wood" in the older compilation, there is also a dry and withered branch in the other, where the Injectio pilocarpinæ hypodermica still holds pride of place, although I have only known one otologist who was accustomed to use it. He believed it was occasionally successful in certain forms of labyrinth deafness. In this connection may be mentioned a special mixture which has been found to bear out the promise of the older school of practitioners. It consists in the frequent administration of small doses of tincture of aconite with the object of aborting a quinsy. It still figures in the "Central" hospital pharmacopœia, one minim to be given every quarter of an hour for four doses. Another prescription not in the collection, which has been found both safe and serviceable, is:—

℞	Tincture of aconite - - - -	1 minim
	Antipyrin - - - - - - -	1 grain
	Caffeine citrate - - - - -	5 grains
	Water to - - - - - - -	1 ounce

Sig. Two tablespoonfuls every hour for eight hours.

To see a lively peritonsillar inflammation subside and disappear in a few hours under its influence teaches some respect for our predecessors. It is not, of course, invariably successful.

SPRAYS AND SOLUTIONS

Oto-rhino-laryngology is only some sixty years old, and it is noteworthy that the *nebulæ* or fine sprays of certain essential oils, such as menthol and oil of eucalyptus, dissolved in an oily medium, which were first introduced by Morell Mackenzie, are still in daily use for nasal and laryngeal catarrhs. A warning may be uttered in passing, that if the solution is too strong it is apt to induce some eczema of the upper lip in nasal application.

The following formula for a sedative spray is taken from the Golden Square collection:—

℞	Chloretone	5 grains
	Menthol	3 grains
	Camphor	1 grain
	Oil of cinnamon	2 minims
	Oil of pine	15 minims
	Liquid paraffin to	1 ounce

In both collections prescriptions for sprays containing cocaine are included, but these should only be used with caution. It is amazing how rapidly the cocaine habit is acquired by certain patients. The addition of adrenaline enhances the value of nebulæ in cases of asthma and allergic rhinorrhœa.

Similar, though weaker, solutions of the essential oils (menthol 2 grains to liquid paraffin 1 ounce) are sometimes propelled by a gentle air-blast into the middle ear through the Eustachian catheter and tube. After a prolonged trial of such modern suggestions as iodolysin, fibrolysin, and so on, I have returned to the simple original prescription as the most reliable, provided we are not dealing with one of the more intractable forms of middle-ear deafness.

The *Collunaria*, or solutions for washing out the nasal cavities—not to be confounded with the *collutaria* or mouth-washes, which, by the way, are absent from the "Central" collection—may now be considered. The douching, syringing, or washing-out of the nose by copious watery solutions, whatever method be adopted, although popular, cannot be said to be free from objection. There is always the danger of the solution, and with it the nasal discharges, finding a way up the Eustachian tube into the middle ear or, for that matter, into a hitherto healthy nasal sinus. The danger may be minimized by using as little force as possible, and by letting the solution, after syringing, spontaneously drip and drain from the nose into a basin before blowing it; and then the blowing should be gentle. Nevertheless, in spite of such drawbacks, the collunaria survive and are likely to go on surviving; they are cleansing and refreshing, as anyone who uses them quickly discovers.

Their constitution varies and the choice is large. Here are two favourite alkaline douches :—

℞	Potassium chlorate	½ ounce
	Sodium biborate	½ ounce
	Sodium bicarbonate	½ ounce
	Sugar in powder	1 ounce

and

℞	Sodium bicarbonate	2 grains
	Sodium biborate	2 grains
	Sodium chloride	2 grains
	Water to	1 ounce

These are usually dispensed in the form of powder to be dissolved in water immediately before use.

A third formula, sometimes known as Dobell's solution, is worthy of citation :—

℞	Sodium bicarbonate	3 grains
	Sodium biborate	3 grains
	Liquid carbolic acid	60 minims
	Water to	1 ounce

It is sometimes used as a stronger solution than the above formula. As it combines detergent and antiseptic properties, it is of particular service in ozæna, a disease which, by the way, is much less frequently seen than it used to be thirty years ago. Its treatment by glucose and glycerine is mentioned by one of the pharmacopœias, not by the other.

It will be observed that most of the collunaria are alkaline, but normal saline solution may be employed.

Sea-water, or a solution of a similar constitution, is favoured in some quarters, and it certainly liquefies mucous and muco-purulent discharges satisfactorily, but it is not included in either of the pharmacopœias. In this connection a word of warning may again be permitted. In order to provide the necessary sea-water, a popular brand of "sea-salt" is sometimes employed, with a most curious and disconcerting result. This salt occasionally harbours the ova of a small but lively crustacean, and they have been known to hatch out in the patient's nose!

A criticism may be made of the absence from both pharmacopœias of some of the more modern collunaria. There is that composed of diluted glycerine of thymol, for example, now official in the B.P., which has earned a deservedly wide popularity in the last ten years. But doubtless the omission will be rectified in future editions. It is always difficult to decide when to insert and when to reject formulæ.

DISEASES OF THE EAR

The remedies for diseases of the ear include a large and, on the whole, a useful and trustworthy collection of ear-drops, applicable to many conditions. To enter fully into the various uses to which they are applied would necessitate writing a complete account of all diseases of the ear that are accompanied by discharge, and only brief allusions can be made to the more common varieties.

It is of the first importance to ascertain the site and origin of a discharge from the ear. Many a case of simple cutaneous eczema of the external auditory meatus has been aggravated and perpetuated by irritating watery or glycerine solutions used as ear-drops. For that reason, to say nothing of many others, an examination of the ear with the auriscope is essential before prescribing drops. As a rough clinical rule, to which there are exceptions in furunculosis of the external meatus and sometimes in cholesteatoma of the middle ear, it is worth remembering that, if discharge from the ear is watery or serous, its probable source is the skin of the external meatus; if purulent, the middle ear.

Every medical practitioner can (and does) syringe out the meatus for impacted wax. Here is a useful prescription for drops to soften, before syringing, what is frequently a hard, almost a stony hard plug. It is included in both pharmacopœias :—

℞	Liquid carbolic acid - - - -	1 minim
	Sodium bicarbonate - - - -	10 grains
	Glycerine - - - - - -	120 minims
	Water to - - - - - -	1 ounce

Even what seems to be simple cerumen, however, may turn out to be something different, which it is dangerous to syringe, namely, cholesteatoma. This is a peculiar disease, usually located in the middle-ear spaces, frequently highly septic and destructive of the bone. Mingled with ceruminous secretion it may resemble a simple ceruminous collection, but it is soft and it emits a characteristically offensive smell, features which distinguish it from the less serious affection. It should not be syringed, but it may be treated by Guttæ acid. salicyl. c̄. alcohol., as the salicylic acid dissolves the epidermal masses of which it is composed. Unless, however, the practitioner has special otological experience, he will do well in such cases to seek the help of the expert, as operation is often necessary.

This naturally raises the question of whether or not the ear should ever be syringed in ordinary suppuration. Both of the pharmacopœias certainly regard the method as routine practice and provide formulæ for a number of lotions to be used for the purpose. Nevertheless, it is the fact that the older the otologist the less he syringes the ear, even for wax. It is never known where the liquid will penetrate, and disasters do occasionally occur. It is much safer to mop discharge out of the meatus with pledgets of dry wool and to be content with the insertion of ear-drops.

For the same reason, there are many experienced otologists who are apprehensive of the all-popular solution of hydrogen peroxide used as ear-drops. To begin with, it is usually acid, as it ought not to be, and is irritating to the tissues, and there is certainly in its effervescence within the confined middle-ear spaces a risk that it may carry the infection further afield.

Of other ear-drops there may be mentioned first the old and popular Guttæ glycerin acid. carbol. dil. (150 minims to 1 ounce), as, in the absence of eczema of the meatus, they are perhaps the safest and most reliable of all, soothing pain and facilitating the outflow of discharge, provided always that the external meatus is not stopped with a plug of cotton-wool.

To enter into the indications for the use of the many other ear-drops formulated in the pharmacopœias would occupy too much space, and readers are referred to the textbooks for fuller information. It may be remarked, however, that for chronic purulent otitis media, alcohol in varying degrees of dilution is the chief standby.

Recognition of the modern method of treating certain forms of suppuration by zinc ionization is manifested in the provision of a formula for the ionizing solution.

Lastly, I am indebted to the Metropolitan Ear and Throat Hospital pharmacopœia for the reminder that, apart from ear-drops, dry treatment of the ear, the following powder being insufflated, has recently enlisted many advocates :—

℞	Resublimed iodine (crystals) - -	3·6 grains
	Boracic acid powder to - - -	1 ounce

The iodine crystals are broken down with a few drops of rectified spirit and the boracic powder added gradually; the powder must be kept in a stoppered bottle.

PHARYNGEAL AND LARYNGEAL DISEASES

Of gargles there is a large choice, some thirteen or fourteen being mentioned. Most of them are familiar, but neither collection contains the anodyne aspirin gargle (10 grains to 1 ounce of water), so useful after tonsillectomy and other operations on the pharynx.

An old-fashioned but pleasant and acceptable gargle is the following :—

℞	Sodium biborate	24 grains
	Glycerine	60 minims
	Tincture of myrrh	24 minims
	Water to	1 ounce

from the Golden Square pharmacopœia.

In the same book a wise hint is given in the remark that gargles can be used " by means of a syringe such as Higginson's." I have found this method of great value after tonsillectomy, and after severe operations such as the diathermy removal of cancerous growths of the pharynx. The patient lies on his side and the nozzle of the syringe is placed at the angle of the mouth.

Turning now to laryngeal remedies, the comfort imparted by steam inhalations (*vapores*) in the various forms of acute laryngitis is well known. The most popular ingredient of the inhalation is Friar's balsam, but several other soothing medicaments are available. It is always advisable to combine the active agent or agents in the hot water with Pulv. magnes. carb. lev. so as to facilitate its vaporization, and readers may be reminded that the hot water should approximate to, but not reach, the boiling-point, as thereby more steam is obtained.

For the more chronic forms of pharyngitis and laryngitis there exist a number of *pigmenta,* all of which are serviceable. It would appear that this method of treating these mucous surfaces enables them to be influenced for good in quite a remarkable fashion.

Many of the pigmenta may be entrusted to the patient to apply himself. A few of the more powerful may be detailed. Here is the well-known Mandl's paint :—

℞	Iodine	6 grains
	Potassium iodide	20 grains
	Oil of peppermint	5 minims
	Glycerin to	1 ounce

Zinc chloride is also an effective local remedy :—

℞	Zinc chloride	10 to 30 grains
	Hydrochloric acid	1 minim
	Glycerine	30 minims
	Distilled water to	1 ounce

Finally, there is :—

℞	Menthol	60 grains
	Liquid paraffin (or olive oil) to	1 ounce

Menthol is sometimes made up with glycerine and rendered more astringent by the addition of liquor ferri perchlor. I have heard that in certain clinics this combination goes by the name of "Pigmentum Melbæ," and is a great favourite with professional singers.

LOCAL ANÆSTHETICS

A few remarks on local anæsthetics may be made in conclusion, as they are in daily use in oto-laryngology. The pharmacopœias give a choice of anæsthetic solutions of which at once the most powerful, reliable and dangerous is cocaine. In order to avoid unhappy accidents with this agent the following precautions should be taken :—(1) cocaine solutions should be coloured; (2) cocaine, whether in solution or in powder, should never be used alone, but always in combination or in conjunction with fresh adrenaline solution; (3) painting the pharynx with even weak solutions of cocaine should be sparingly practised, and the patient should be warned not to swallow it; (4) avoid excess of the solution on the applicator; (5) cocaine solutions should *never* be injected, one of the other local anæsthetics being substituted for it; (6) toxic phenomena should be watched for and promptly treated.

SLIMMING PROBLEMS IN CHILDREN AND ADOLESCENTS*

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BY using the term "slimming problems" I intend to convey the fact that I am not here merely concerned with questions and methods of weight reduction: there is more of interest in the subject than that. It is true that in the majority of instances these problems arise in those who are, or who think themselves, too fat: but occasionally we are confronted with exactly the opposite condition, that of the patient who has so reduced weight as to call for counter-treatment. It may seem a pity that the degree of slimness now favoured by fashion may mean in certain people a real degree of under-nourishment with consequent loss of physical health and vitality. Our patients would, perhaps, be helped more if it were borne in mind that each individual has an optimum weight, a weight at which the general health is at its best, and that this by no means necessarily corresponds with the patient's minimum or maximum weight.

In one way these slimming cases are rather different from the ordinary run of patients, for in the vast majority of instances their condition, be it too fat or too thin, is not primarily due to any form of physical disease or disorder. This brings the psychology of each patient well to the forefront of the problem.

It is convenient to consider the subject in four age-groups: (1) infancy; (2) childhood to puberty; (3) puberty to adolescence; (4) adolescence.

Late infancy.—There is a normal fat period in late infancy, just before the child begins to get on its feet and toddle about. If there are no signs of rickets, anæmia, hypothyroidism or conditions of that sort, this fat stage may be regarded as natural, though it may perhaps delay somewhat the acquirement of the power of walking. As a rule therefore no treatment is needed. In exceptional cases when treatment may be advisable it is better to lessen the amount of fat and sugar in the diet than to reduce seriously the quantity of food given.

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* A postgraduate lecture given at St. Mary's Hospital.

Childhood to puberty.—During these years many children remain overweight. They are usually healthy, tall, strong, robust and of good colour. Two physical complaints sometimes trouble them. The girls seem more than usually subject to vulvitis, and both sexes may complain of pains in the legs. The latter may lead to a suspicion of rheumatism, though any children less like rheumatic children than these fat rosy-cheeked individuals it is impossible to imagine.

Attempts are made to classify these overweight children into three groups, endogenous, exogenous, and endocrine. Such a classification is not too successful. It is, for instance, not easy to distinguish an hereditary trait which ranks as endogenous from such an exogenous cause as familial over-eating. This is not of great importance, but something more must be said on the subject of endocrine disturbance associated with obesity, more especially as a diagnosis of Fröhlich's syndrome is often made quite unjustifiably in these children.

Obesity is known to be associated with diseases and disorders of the pituitary, hypothalamus, adrenals and thyroid, and it is with the first-named that we are here concerned. Fröhlich's syndrome, which is often diagnosed light-heartedly, is a serious and rare condition. It is due to an organic lesion affecting the pituitary and leading to hypo-secretion of its posterior lobe. The lesion may be a tumour or a sequel of encephalitis or meningitis. The most obvious signs of Fröhlich's syndrome are three in number. First, obesity affecting chiefly the shoulder and pelvic girdles but to some extent generalized; secondly, retarded growth with delayed ossification of bones; and thirdly, sexual infantilism with delayed development of secondary sexual characteristics. Sexual infantilism is with difficulty appreciated before puberty, and it is often suspected unjustifiably as is proved later by the punctual appearance of the changes of puberty; but the other signs of Fröhlich's syndrome are clear. It is therefore well to remember that Fröhlich's syndrome is a rarity. H. Gardiner-Hill says[1]: "Fröhlich's syndrome in its true form is a comparatively rare disease and the majority of fat children in medical practice have no defects of growth or sex development at all." A recent study by R. W. B. Ellis and K. Tallerman[2] of a series of 100 children, all of whom were 25 per cent. over the average weight for both age and height, showed no single instance of organic pituitary disease or of structural or genital infantilism. Even when the obesity tended to show girdle distribution puberty was in no case delayed. It is wise therefore to pause before making a diagnosis of Fröhlich's syndrome.

Yet it is difficult to think that in these overweight and overgrown children the pituitary is acting quite normally. If there is pituitary dysfunction it is probably of the nature of over-activity of the anterior lobe rather than under-activity of the posterior lobe. This is difficult to prove in children, but it may be said that their condition of overgrowth and obesity corresponds with that produced experimentally by injections of anterior pituitary extract. If this is so, it must be allowed that this form of pituitary hyper-secretion can be inherited and familial.

Treatment for obesity in children at this age is rarely necessary, and the indiscriminate use of thyroid preparations should be deprecated. These should only be employed when there is definite evidence of hypothyroidism. In deciding if it is worth while to institute some minor restrictions in diet, it should be remembered that during these years most children have several illnesses to get through, and that the growth and development of puberty usually lead to reduction in weight. It is therefore all to the good to have a little extra to spare for this. Any tendency to habitual over-eating, which is common in these children, should be checked.

Puberty to adolescence.—Between puberty and adolescence, that is to say during the last years of boarding-school life, up to 17½ or 18 years of age, puberty and the years succeeding have thinned down most of the overweight children. However, a considerable number of these large fat children remain, and most boarding-schools for girls contain one or two, for the condition at this age seems to be much more common in girls than in boys. In first-class boarding-schools, they work and play hard in bracing surroundings, and appetites get very large. Supplies of food which suffice in the first week of term are quite inadequate a fortnight later. Perhaps the most fattening of school meals is the tea. This consists of enormous supplies of bread, butter, jam and cake, and is only terminated when appearance at "prep." can be no longer delayed.

A good deal is heard from psychologists about the woes and trials of these fat children at school. It is said that they are unmercifully teased and tend to develop a sense of inferiority. It may perhaps be so in a few cases, but in my experience it is quite exceptional. On the contrary they are usually jolly girls and universally popular. They are credited with a special aptitude for keeping goal and in plays and charades they take the male parts. Altogether they are usually very happy, and the only difficulty with them is to make them take the slightest interest in their figures or weights: it is the parents who are worried about these things.

Treatment may be needed for these fat girls of sixteen or more years of age, and parents often insist that the child be dieted while at school. How shall this be done? The first essential is that it should not upset the child. It must be remembered that at this time the girl is probably working for various examinations, and anything like serious underfeeding will lead to ruining her work by spoiling her power of concentration, in addition to making her bad-tempered and emotionally unstable. It is interesting to see how the mere restriction of food beyond a certain point will turn a happy, friendly girl into one so ill-tempered and scratchy that no one dare approach her. To overcome these difficulties it is advisable to make the chief change in the diet in quality rather than in quantity. If the fat-producing foods are forbidden the child can eat sufficient to feel satisfied and yet lose ½–1 lb. per week in weight. Such a diet as the following should be within the competence of a good school to provide:—

Breakfast: One egg, boiled or poached; fish; lean ham or tongue; bread substitute; lettuce; tomato; fresh fruit; tea with saxin.

11 *a.m.:* Water; bovril; oxo.

Dinner: Fish; chicken; game; rabbit; lean meat (preferably cold); green vegetables; sea-kale; French beans; celery; baked apple; stewed fruit; fresh fruit; bread substitute; cheese.

Tea: Tea with saxin; two water biscuits.

Supper: As dinner.

Bread substitutes: Vita-weat, Macvita, Kalari biscuits.
Fruit: all fruit allowed except bananas and nuts.
Vegetables: allowed as above.
Fats: no butter, oil, fat of meat, pork, cream allowed.
Milk: in minimum quantities.
Sugar: use saxin at table.

On such a diet a girl may eat enough to be satisfied and to keep cheerful and strong. She should be warned that relaxations will lead to a rapid gain of weight, and that she must keep strictly to the diet.

Adolescence.—As already stated it is difficult to get a girl still at school sufficiently interested in her figure to take the pains to reduce it. But later, after school days are over, she may begin to care very much about her appearance. If she then diets sanely she loses weight and all is well, but in some instances the process of slimming gets altogether out of hand and a condition simulating that of anorexia nervosa may develop and give rise to real anxiety.

It is interesting that this process is started volitionally by the patient. It originates doubtless in vanity, but after all this is a more or less harmless foible. Vanity is quite a different thing from pride; and a desire to look as much as possible like other people is something far less obnoxious than the desire to be different. With this voluntary restriction of food there is a rapid loss of weight. These patients are curiously alike. They take the dog out for long walks and eat hardly anything afterwards. They state that they feel far better without food, but the developing irritability and emotionalism make it clear that this is a mistake. Presently it is a relief to complain of discomfort after food, and this gives them further excuse for refusing food. The indigestion is regarded as the cause of the loss of weight, whereas it is really the result of the underfeeding and nervous upset. In time the condition may become really alarming; the extremities are perpetually stone cold, the pulse rate is down to 45 or 50, and œdema of the ankles may appear. Still the patients persist that they feel quite well and with tears and tantrums refuse to increase their diet.

It is difficult to understand why, in these exceptional cases, the process which is started volitionally passes into an apparently hysterical obsession. The two chief factors seem to be the inherent mental make-up of the girl, and the influence of undue concern on the part of the parents. Although it is the fashion now to blame the parents for all the excesses of their children, the inborn psychological pattern of the child is the more important. It is, of course, easy for the girl to bring forward unkind remarks about her size as a reason, but such could never excuse the absurd lengths to which the slimming craze is carried in such a case.

The treatment of such cases as these may raise difficult problems. Here is a condition of ill-health, of a degree often causing anxiety, which has no physical disease or disorder as its basis. The refusal to take food is due to some psychological bar. On what lines is the case to be treated? There are various alternative principles but whichever is adopted the impression that is going to be left on the mind of the patient must be remembered.

There seem to be three principal lines on which such cases as these may be treated, and although in practice they overlap, they must be considered separately. Very roughly they may be called methods, first of force, secondly of suggestion, and thirdly of co-operation.

First, to apply force, or such persuasion as amounts to moral force, is to get a patient better in spite of herself; and this is no real cure, for the girl is not cured until she consents to take a normal amount of food for normal reasons. Although there are weak-minded patients who like their doctor to dragoon them like a drill-sergeant, the undisciplined adolescent female is not of this category and she will be intensely resentful against all concerned. When she gets well she may take a more lenient view, but it will remain easier for her to think that she has been ill-treated and made a fool of, than to admit to herself that she has been foolish. I suppose in the worst cases there is nothing for it but the use of force, but evidently it does not always succeed as there is an appreciable death-rate in anorexia nervosa.

Secondly, there is the method of treatment that relies chiefly on suggestion, and by that is meant a suggestion of something that is not entirely true. It is possible to settle the patient down to some long treatment of gastritis or peptic ulcer, or to invoke some germ-poisoning needing a long course of vaccine treatment, or to start upon some form of psycho-therapy. Some doctors are able to carry such a line of treatment through with amazing consistency and they get their good results. Others with less faith are less successful. To give it its due this method avoids upsets and rows; but at the end of it the patient has learned nothing true and looks back, possibly with pride, on a time when she had so obscure and long an illness.

Lastly, there is the method of trying to gain the patient's co-operation by explaining to her the real state of affairs. She may be told that the symptoms of which there are complaints are results and not the causes of her trouble, and that the under-nourishment is at the bottom of it all. She should be told that it is recognized that it will not be easy for her to start to eat properly and that she will feel heavy and distended after each meal; but that if she will stick to it for three or four weeks the discomfort will diminish and the appetite return. It will be found that with whatever kindliness these explanations are made there will be a big emotional reaction with tears and protestations. This is partly due to the fact that her bubble is burst and the truth is out, and partly to the fear of being looked down on. This last is naturally a big thing, and everything must be made easy for the girl to turn over a new leaf. It is not fair to expect her suddenly to eat well at her home where for months she has been swearing that a little ripe fruit is all she requires. She should therefore be sent away somewhere to new surroundings to make things easy. If the case is not too far gone a cruise, with all its novelty and variety, may be of the greatest help. Each individual case will need a separate consideration of the necessary details.

I have gone into these principles of treatment, not because we are all treating such slimming problems all day, but because the same principles are involved in treating the psychological aspect of so many functional and organic conditions. For myself, although I know many will not agree with me, I believe that the right principle is to get the patient sooner or later to face the realities of the position, for if there is such a thing that may properly be called "mental hygiene" this must be one of its first principles.

References

[1] Gardiner-Hill, H. : *The Practitioner*, 1935, cxxxiv, 480.
[2] Ellis, R. W. B. and Tallerman, K. : *Lancet*, 1934, ii, 615.

TRAUMATIC INJURIES TO THE KNEE JOINT

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THE popular feeling that any injury to the knee joint is a serious matter rests on sound clinical and anatomical data, and to understand the subject thoroughly the mechanism and anatomy of the joint must be studied separately.

THE MECHANISM OF THE KNEE JOINT

The knee joint, which is the largest in the body, owes its great strength chiefly to the powerful ligaments that unite its two component bones. It derives no strength from the articular facets, which consist mainly of two rounded condyles articulating with two shallow depressions on the tibia.

The motions of this joint are antero-posterior gliding movements, and rotation of the tibia on the femur, for the ligaments allow no other movements. In no position of the joint is lateral movement normally possible, but, when in partial flexion, certain rotary movements can take place, and every time the knee is fully extended a certain degree of outward rotation normally occurs. The ligaments which prevent lateral movement during extension and during slight flexion are the lateral ligaments and, during acute flexion, the crucial ligaments. Hence rupture or stretching of these give abnormal movement. It is obvious also that in a condition of strain the muscles are valuable accessories, but they are quite inefficient as substitutes for either the crucial or the lateral ligaments, should these be put out of action. Flexion of the knee takes place between the semilunar cartilage and the femur, the disc moving with the femur. Flexion of the joint is checked by the contact of the leg with the thigh, and is effected by the hamstring muscles, assisted by the gracilis and sartorius, and indirectly the gastrocnemius. Extension of the leg on the thigh is allowed until the leg and thigh become a straight line and is produced by the quadriceps extensor.

THE ANATOMICAL CONSIDERATION OF THE KNEE JOINT

The internal lateral ligament plays the most important part in injuries to the knee joint. It is a broad membranous band attached at its proximal end to the femur. It passes downwards, and at its distant end is attached to the inner border of the shaft of the tibia, while its deep fibres are intimately connected with and attached to the capsule of the joint, and the internal semilunar cartilage, as well as the anterior edge of the internal tuberosity. These deep fibres of the ligament help to move the cartilage with the internal condyle of the femur.

The external lateral ligament consists of two parts, a short posterior part and a long external lateral part, which, along with the tendon of the biceps, strengthens the outer aspect of the joint. The posterior ligament, along with the tendon of the semi-membranosis, is very much expanded, and known as the ligament of Winslow, forms part of the floor of the popliteal space and binds the joint behind.

With regard to the cartilages, each cartilage assists the opposite lateral ligament in resisting the lateral movements of the leg, for it acts as a wedge between the tibia and the femur, and helps to make the crucial ligaments tense. The external semilunar cartilage is separated from the capsule of the joint, where it is crossed by the tendon of the popliteus; while at its posterior horn a special slip of attachment runs to the popliteal notch of the femur in conjunction with the posterior crucial ligament, an important point in cartilage trouble. The internal semilunar cartilage is attached to the capsule, along the whole of its convex margin, and is firmly connected with the strong internal lateral ligament; in its posterior half its anterior cornu is always attenuated, and its attachment to the tibia never very strong.

It is easy to realize that a strain, suddenly put on the internal lateral ligament, especially if the femur is being rotated inwards on the tibia, will tend either to detach the anterior cornu or split the cartilage longitudinally, or in rare cases transversely, just in front of the attachment of the internal lateral ligament. This shows how intimately connected are injuries to the lateral ligaments and displacement of the cartilages. What usually takes place is that the lower attachment of the ligament gives way; the semilunar cartilage is then drawn back by the condyle, and the anterior end becomes worn and pinched between the bones. It can easily be understood how it is that the internal lateral ligament so frequently suffers injury. It is subjected to a great strain when the foot is firmly planted and abducted, and the knee either slightly bent or kept extended, as in a footballer meeting with resistance, or as in cricket in the "stroke to leg," or in the final act of the bowler when body weight with rotation oι the femur is employed.

The internal semilunar cartilage is also attached by structures which allow it to be lifted fully ¼ inch, a point of importance. If the internal lateral ligament gets torn above the level of the joint, the cartilage remains on and attached to the tibia; if below the level of the joint, the cartilage follows the rotary movement of the femur. If rupture of the ligament takes place both above and below the joint, that is the cartilage gets detached from the ligament, it becomes a simple matter to push it into the joint. This allows a separation of the joint surfaces, and a gliding inwards of the cartilage, and as the separate bones—i.e. femur and tibia—snap back, the cartilage is nipped, and the knee is fixed in a very painful position. The resultant pain and effusion are due to injury to the synovial membrane.

The crucial ligaments extend from the intercondylar notch of the femur to the upper surface of the tibia. They are intra-capsular but extra-synovial.

The anterior is attached to the depression in front of the spine of the tibia, being blended with the anterior extremity of the external semilunar cartilage. It passes obliquely outwards, backwards and upwards to be inserted into the inner posterior portion of the internal surface of the external condyle. The posterior crucial ligament is the stronger and the shorter of the two; it is attached to the back part of the depression behind the spine of the tibia, to the popliteal notch, and to the posterior extremity of the external semilunar cartilage. It passes upwards, forwards and inwards to be attached to the anterior part of the external surface of the internal condyle of the femur. These ligaments are never lax, but the anterior is more tense in extension and the posterior in flexion.

It will be seen if, as in football, the man is kicking hard while on the move at a ball which is blocked by an opponent, and the leg up to the tibia is fixed while the weight of the body with the impetus of the kick carries the femur forwards, then these ligaments are stretched or torn, and an injury is received which simulates and is so often mistaken for cartilage trouble, yet is much more serious.

The synovial membrane of the knee joint is the most extensive and complicated in the body.

It bulges upwards 2½ to 3 inches below the extensor tendon in front of the femur; it invests the circumference of the lower end of that bone, and is reflected upon the fibrous envelope of the joint formed by the anterior, posterior and lateral ligaments; it passes over the greater portion of the crucial ligaments, but does not completely invest the posterior surface of the posterior ligaments; it was supposed to envelope and invest both surfaces of the semilunar cartilages, but later research proved this to be wrong. At the back of the articulation two pouches are prolonged beneath the muscles, one on either side, each between a condyle of the femur and an origin of the gastrocnemius. There is also in connection with the joint a large pad of fat, extra-synovial but intra-capsular; this lies between the two bones and is attached to the infra-condylar notch in front, i.e. ligamentum mucosum. This changes shape with each movement of the joint.

DISORDERS OF THE JOINT

So far the mechanism of the joint has been considered along with its anatomical arrangements. A few of the commoner injuries, and their treatment, will now be described.

Bursitis.—(*a*) The prepatellar bursa is in the subcutaneous tissue in front of the patella. The treatment of inflammation here is quite simple. In acute non-suppurative cases this is best achieved by soothing lotions, such as lead and opium, or glycerine with belladonna, and complete rest of the leg. In septic cases incision and drainage are required, and in chronic cases excision. (*b*) The deep infra-patellar bursæ are above the upper part of the tubercle of the tibia and between it and the patella. Inflammation here is usually of a chronic non-suppurative type. Treatment should be by rest and radiant heat, followed by massage and passive movement. (*c*) The suprapatellar bursa is considered as part of the joint, and inflammation is treated as synovitis.

Baker's cyst.—This is the name given to two pouches of synovial membrane, sometimes connected with the joint proper, which exist in the popliteal region between the insertion of the muscles and the bone. These are usually associated with synovitis. Rest, with fixation of the knee, will generally effect a cure, but excision may have to be done. It must be remembered, however, that opening these bursæ may mean opening the joint.

Synovitis of knee—1. Acute traumatic. 2. Chronic. —Acute traumatic synovitis of the knee, when not accompanied by fracture or other injury, runs a simple, uncomplicated course. Rest to the joint is indicated, but rest alone only increases the muscular atrophy. Thus, massage, when it can be obtained from skilled hands, should be employed from the first. Measures to increase the local circulation, such as radiant heat, hot packs and douches, are valuable. Movement is generally painful, and tends to excite the membranes to further secretion and the putting of any weight on the leg is undesirable. The most comfortable position is to place the leg, with the knee slightly bent, on a pillow between two sandbags. As soon as the swelling has disappeared, non-weight-bearing muscular exercises are of great value, for the leg will remain useless from muscular weakness alone even although the joint has recovered. To overcome that, increased restive exercises, and massage, aided by voluntary contraction of the muscles and regular gentle use of the joint, will soon bring about a recovery.

Chronic synovitis.—In chronic cases the symptoms are much the same but less marked in severity, and the first thing to do is to have a carefully taken X-ray print to make sure there is no accompanying injury to the bone or cartilage, or a torn ligament, or that a synovial fringe is not getting nipped between the bones. For simple chronic synovitis, one of the first things to do is to apply a large pad of cotton wool (e.g. ½ lb. roll, fluffed out before the fire) over the joint, and over this mass a bandage is firmly applied. If pressure is applied over an insufficient quantity of padding, circulation is impeded. This, accompanied by radiant heat, massage and electrical treatment, will effect a cure, and also tone up the muscles concerned. Wasting of the muscles round the joint, with consequent weakness of the limb, is a common sequel to chronic synovitis, if not watched and treated.

LIGAMENTS AND CARTILAGES

Strain or rupture of the lateral ligaments.—The internal lateral ligament is the most commonly affected. This is most often done with eversion of the foot and abduction of the leg in slight flexion, i.e. the common footballer's strain in trying to take the ball from an opponent. Its simplest form is seen when the fibres going from the condyle of the femur to the adjacent part of the inner condyle of the tibia are torn. In many cases a flake of bone is torn away either from the femur or the tibia, but more commonly the tibia, constituting what is known as a " sprain fracture." The patient complains of pain on the inner side of the joint, particularly when he twists his foot outwards. The tender spot is most marked along the line of the tibia, and the joint is distended with fluid. The external lateral ligament is much less frequently injured, and the accident is produced either by a direct blow, or by adduction and rotation inward of the knee in a flexed position. This injury is fairly common in miners, while kneeling in a cramped position at their work. Effusion into the joint only occasionally occurs, and the pain is felt in a line with the head of the tibia.

Treatment.—Injuries to the internal lateral ligament are much more serious than to the external, for the latter is never complicated by a displacement of the cartilage. Too much importance cannot be laid upon the necessity of keeping the torn ligament at rest until the tissues have consolidated; further, rupture or stretching of the internal lateral is often the origin of cartilage displacement, which may be traced to early passive and active movements.

Non-operative treatment.—This consists of the application of a splint—to be worn for a fortnight while the accompanying synovitis is treated. When the patient is allowed up, say, at the end of three weeks, he should be taught to deviate the body weight from the ligament by walking with his toes turned in. The inner side of the foot should also be raised ¼ inch by a piece of leather on the sole of the boot to relieve the strain on the ligament. The treatment of the external lateral ligament is much the same—fixation and the deviation of the body weight in the opposite direction; massage, radiant heat and electrical treatment to the muscles are applied in both cases.

Operative treatment.—Edward's operation is best; simplified, it is the transportation of flaps of fasciæ lata to support the torn ligaments.

Displacement of the semilunar cartilages.—The internal cartilage is more commonly injured than the external cartilage, according to Sir Robert Jones: his proportion was 9 to 1. In view of this fact, it is well to remember that displacement of the internal will at times give rise to symptoms on the outer side of the joint. The most frequent injury to the inner cartilage is due to the fact that it is more firmly anchored than the external, which has more give-and-take movement given it. The internal rotation of the femur on the tibia is greater on the inner side, thus putting a greater strain on the internal cartilage. In all cases the cartilage is displaced inwards, and in cases in which a protrusion has been felt from the outside it is due to bruising, hæmorrhage or a buckling of the cartilage which gives an irregular feel to the articular margin. Again, taking into consideration the fact that the cartilage is wedge-shaped, a displacement outwards could not possibly produce a locking of the joint, which can only occur when the displaced cartilage, acting as a foreign body, gets jammed between the bones. This jamming gives rise to the acute painfulness of the attack.

The most common symptom is that, while undergoing some great strain, the patient finds that he is quite unable to extend his knee, as is a common event on the football field. He has intense pain and hobbles off the field with his knee semiflexed. After movement by friends, who try and sometimes succeed in reducing the condition, he is seen by the doctor, who finds a distended joint, painful to manipulate on passive movement. In many cases a gap can be felt on the inner side with tenderness over the articular edge of the tibia, and pain between the bones on pressing on the inner side of the patella. After rest in bed and massage for about three weeks, the usual treatment is to allow the patient up and liberty to walk. This is a grave mistake, for very soon a similar attack occurs, usually milder in effect, and as time goes on these attacks become more frequent, until of daily occurrence.

In the case of the external semilunar cartilage, displacement occurs chiefly in miners, when the knee is in acute flexion, and a "back snap" occurs when extension is completed. When the knee is moved passively a clicking occurs, quite loud and often associated with some rotation of the tibia. This condition is rarely accompanied by pain or effusion, and is known as "trigger knee."

Differential diagnosis.—1. Synovial fringes: The nipping of a synovial fringe has less acute pain than a cartilage; it is strictly local, and not participated in by the internal lateral ligament. Sometimes a prominence may be found over the site of pain, but no matter how often a nipping occurs, effusion quickly follows with creacking of the joint and swelling on each side of the patella, due to chronic thickening of the infrapatellary pad.

2. Loose bodies: These can usually be found and isolated. They often lock the knee, but only transiently; effusion into the joint is common to both.

3. Lipomas: These sometimes lock the joint, but in that case the swelling is about the lower part of the patella with painless effusion. Exercise rather than accident produce these symptoms.

Treatment: 1. Mechanical. 2. Operative.—No golden rule can be laid down as to when a knee should be operated on, or when mechanical means ought to be tried. Each case must be treated on its merits. A large proportion of the patients make a good recovery under mechanical treatment. All first cases should be tried by that first, and all chronic cases that are not painful and are not followed by effusion. Operation is essential in all cases where the patient has to stand or work in a position where a yielding knee may mean danger. Age is not necessary a contraindication.

Mechanical treatment.—When the injury is seen immediately, the following three points must be remembered: (*a*) Reduction must be absolute. (*b*) All movement of the cartilage must be checked until union of the torn structures is complete. (*c*) No lateral strain must be allowed until the internal lateral ligament has recovered its tone. No reduction is complete until the knee can be voluntarily held in complete extension. The following is the best method of reduction, and may be done without an anæsthetic :—

The surgeon fully flexes the knee and rotates it inwards on the femur, and at the count of three the patient is told to kick as hard as he can while the surgeon helps him by pressing downwards on the thigh and upwards on the leg. When reduction has been effected, the limb should be fixed for two or three weeks and no movement at the knee allowed. The tone of the muscles can be kept up by massage and electrical treatment. If this is done a recent first displacement rarely recurs. But if, however, massage and movements are used instead, it is the beginning of trouble. On getting about, the patient should be taught to save his internal lateral ligament from strain, to walk pigeon toed. The boot should be altered, the heel being elongated and raised ¼ inch and the inner side of the sole fortified by a similar wedge of leather, and in addition a cage splint (or Shaffer's splint) used. This is a hinged splint with gauge controlling the movements of the joint. If this does not succeed and operation is desired, the usual operation for excision of the cartilage is done.

Rupture of the crucial ligaments, with or without fracture of the spine of the tibia.—This is much more common in footballers than is generally supposed. If, after an injury, the tibia can be displaced backwards or forwards a little, or rotated inwards in the extended position, a rupture or lengthening of one or both ligaments can be diagnosed. If, in the extended position, the tibia can be moved forwards, the posterior ligament is affected. If, in full flexion, the tibia can be moved backwards, the anterior has gone. In all these cases the internal lateral ligament is also involved.

Treatment.—Rupture of the crucial ligaments, or even strain and elongation of them, is a severe injury. Its ill effects, however, can be much diminished if, from the first, it is treated by complete and prolonged immobilization of the knee. Under no consideration should active or passive movement be permitted under from two to four months, and even then it must be done very carefully, for four to five weeks are essential to the repair of the ligaments, and any elongation or laxity means functional disability. It is also known that during the accurate repair of ligament no strain should be put on them during the period of healing. The fear of a stiff joint often results in a policy of impatience, but only temporary stiffness follows a few weeks rest. Not until every trace of " flail " movement has been eliminated should a jointed splint, starting with graduated movements, at first 20° be applied, and increased gradually. A footballer should not be allowed to kick a ball until twelve months after such an injury. Prolonged rest with electrical treatment, massage and radiant heat, will often effect a permanent cure. For the more serious cases with fracture of the spine of the tibia, Hey Groves' intricate operation is done. This, put in simple language, is when the condyles of the femur are drilled and the torn ligaments are threaded into a new insertion.

Two other rather rare traumatic conditions may occur.

1. *Slipping patella,* occurring as a traumatic condition in adolescent girls, with a varying degree of knock-knee and an elongated patellar tendon with a general laxity of the joint. Mechanical treatment is only useful in early cases. The operative treatment is either Goldthwaite's operation or Tubby's operation.

2. *Separation of the tubercle of the tibia,* due to strain or muscular effect, occurs in boys of from 10 to 15 years of age. It is an injury of adolescence, and Osgood's operation is the best cure.

SOME RECENT ADVANCES IN ENDOSCOPY

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THIS article is based on personal experiences while an assistant in the Chevalier Jackson Bronchoscopic Clinic at Temple University Hospital in Philadelphia, during the tenure of the Geoffrey E. Duveen Travelling Studentship in Oto-Rhino-Laryngology, University of London. The scope and variety of the work in the clinic came as a complete surprise, as did the amount of assistance the other members of the medical staff expected it to afford. The volume of work demands a full-time staff of four doctors, three nurses and two secretaries, as well as an extra nurse on operating days. When the presence of three other similar clinics in the city is remembered, and when it is considered that no operative ear, nose and throat work (except some laryngeal surgery) is carried out these figures are all the more surprising.

For many years Dr. Chevalier Jackson has made strenuous efforts to obtain recognition of the usefulness of endoscopy, and has at last won over many of the physicians and surgeons. Endoscopy is not to be considered an end in itself—it plays this part only when a foreign body is in question. To a large extent its importance lies in diagnosis, but it is also occasionally a valuable therapeutic measure. In these respects endoscopy resembles radiography, and, although not so ubiquitous, is as indispensable within its narrower limits. In certain diseases an absolute diagnosis can only be made by an endoscopic examination; in others it has an indicative value.

To obtain the maximum assistance from this method of examination expensive equipment and a highly trained staff are necessary, but this applies to an X-ray department with even more force, and is no reason for dispensing with such aid. The Jackson Clinic has been described elsewhere and it must be emphasized that useful work can be achieved with a much smaller organization, and many such miniature " Jackson Clinics " exist in the United States.

The examination fields of peroral endoscopy are the respiratory tract down to the secondary bronchi, and the alimentary tract to the gastric side of the pyloric sphincter. Manipulations, with the help of X-rays, can be performed throughout the whole extent of both these fields. Advances have been made in examination and manipulation within the last few years. The scope of bronchoscopy has vastly increased, and in Jackson's Clinic the cases of foreign body number only five per cent. of the whole. Œsophagoscopy is also becoming of more importance, as recognition spreads of its ease and freedom from danger in skilled hands. Schindler's flexible gastroscope has, in the past two years, made direct inspection of the interior of the stomach both safe and comprehensive.

Endoscopy should be performed only after thorough physical and radiological examinations, particularly important points being the condition of the larynx, as seen in the laryngoscopic mirror, and the lumen of the œsophagus, as visualized by the radiologist. The value of the method lies in its achievement of completeness and conclusiveness, and it should come as the climax to a series of investigations. Naturally the converse is also true, i.e. that if the endoscopist does not help by positive information (of either the presence or absence of disease) the method should be regarded as unsuitable, although training and organization will do much to lessen the number of such cases. The borderline between so-called medical and surgical diseases is abolished for the endoscopist who is prepared to help alike the physician or surgeon.

LARYNGEAL DISEASE

In the diagnosis of laryngeal disease the direct method of examination has been used for many years, and in the removal of benign growths it has largely supplanted the use of the laryngeal mirror. For the treatment of stenosis of the larynx, whether due to trauma, inflammation or benign tumour, the passage of bougies under direct vision is now well recognized. Recently, in Philadelphia and Boston, intubation of the larynx in children with diphtheritic or other inflammation has been practised through the direct laryngoscope, and the method is held to possess several advantages over blind intubation or tracheotomy. The procedure can be readily performed in bed in a very short time by a practitioner used to the exposure of the child's larynx with this instrument.

LUNGS AND BRONCHI

In disease of the bronchial tree and lung parenchyma bronchoscopy can be of enormous value. It is a well-known point of morbid anatomy that in the great majority of cases of carcinoma of the lung the origin of the growth is in the larger bronchi, a region easily examined with the bronchoscope. A diagnosis by inspection and biopsy can thus often be made before opacities in the lung field or occlusion of a bronchus are demonstrable radiologically. In these days of rapidly improving technique in thoracic surgery and X-ray therapy the value of such early diagnosis need not be further stressed. Certain authorities hold that a combination of radium and deep X-ray therapy is the most promising line of attack on malignant growths. The assistance of the bronchoscopist is demanded in these cases to insert either radon seeds or a radium container. The intra-bronchial insertion of radium is of great aid in keeping the patient fairly comfortable during the later stages of the disease, as it maintains a lumen and avoids the distressing symptoms of atelectasis.

In the diagnosis and treatment by aspiration of lung abscess and bronchiectasis the bronchoscopist has played a useful rôle for many years. The surgeon has latterly derived much assistance from a pre-operative aspiration when he is undertaking a lobectomy, and certain cases of massive collapse after operations unconnected with the lungs respond magically to aspiration of an obstructing plug of thick mucus.

Some cases of suppuration in the bronchi and lung tissue have baffled diagnosis or have been considered to follow an unresolved pneumonia. It is becoming increasingly recognized that an overlooked inhaled foreign body, especially in children, is often the cause. The condition is admittedly uncommon, but two facts must be remembered. First when a foreign body is removed within a reasonable time the lung recovers completely. Secondly, once a condition of bronchiectasis or multiple lung abscess has been established it is permanent. All cases therefore of the type described above should undergo bronchoscopy as a routine investigation. Many physicians, especially in America, have chosen among their more stubborn cases of pulmonary suppuration a number for treatment by bronchoscopic aspiration and lavage with antiseptics. This method should certainly receive a more extended trial, as there have been some encouraging results.

ASTHMA

There are a few cases of asthma which will resolve with the administration of autogenous vaccines which are most useful when obtained uncontaminated from the depths of the bronchial tree. Other asthmatics are relieved for varying periods by bronchoscopic aspiration of secretion. This secretion is very viscid (it will not flow even when held upside down in a tube), and is never more than a few cubic centimetres in amount. Its consistency hinders its removal by the normal mechanism of ciliary action and cough (the " tussive squeeze " of Jackson), and its presence appears to set up attacks of spasm. When removed the asthma ceases for a time and returns as the secretion re-accumulates. This interval lengthens, and treatments become necessary less frequently, until the patient requires perhaps one a year to keep him free of attacks. In actual numbers, and even in proportion to the whole, these two groups of cases are small, but, as great relief, if not cure, is effected, the total gain is considerable. All cases seen in the Asthma Clinic not sensitive to a specific protein are sent to the Jackson Clinic.

ADVANCES IN TECHNIQUE

In the technique of examination many advances have recently been made, notably the application, by Scott Pinchin and Morlock, of the principles of cystoscopy. They have developed a magnifying telescope which is inserted through a modified Jackson's tube, and have also designed an operating bronchoscope through which precise manipulations can be performed under magnification obtained also with a telescope. These instruments have not quite the same adaptability as the Jackson instruments, for the second cannot be used in children owing to its size, and the telescope is useless in cases in which there is much secretion or pus. For leisurely and minute examination in a " dry " case, and for accurate selection of site from which to remove tissue for biopsy, as well as the accurate performance of this operation, these new instruments are without rival.

The biplane fluoroscope has added immensely to the facility with which radio-opaque foreign bodies at the periphery of the lung and in the stomach can be removed. This type of fluoroscope, designed originally by Manges, has received many additions from other radiologists, especially Chamberlain, working with Dr. Jackson. The latest model housed in the clinic has been used in many dramatic cases. Even with this assistance the manipulations require a high degree of skill and delicacy and demand endoscopic technique of the very best.

THE ŒSOPHAGUS

Dysphagia is the cardinal symptom of the great majority of the œsophageal cases. As this so often presages the discovery of an œsophageal carcinoma, radiological and œsophagoscopical examinations should be performed on any patient in whom this symptom has been present for longer than two or three weeks. The X-rays can indicate, but only direct vision (with removal of a piece of tissue for biopsy) can diagnose with certainty the existence of this disease. While the therapeutic outlook is still gloomy, sufficiently early diagnosis may result in a more hopeful prognosis as the operative and radiological methods of treatment improve, and is essential for the complete success of either method. A high proportion of the œsophageal cases come into this category.

Apart from the impaction of foreign bodies in the œsophagus, strictures often occur. American children apparently ingest caustic cleansing materials for kitchen use in a manner unknown in this country, with resulting " lye " strictures. Adults occasionally drink caustics by accident or in an attempt at suicide. The third type of stricture occurs at the lower end of the œsophagus, and is the sequel to the so-called " peptic " ulcer of the œsophagus. The condition is frequently associated with a congenitally short œsophagus, with or without herniation of the stomach. Finally, many cases of achalasia of the cardia are seen which, from the symptoms of stricture characteristic of the disease, can be conveniently placed in this group. The principles of treatment are the same for all these cases. Strictures are dilated regularly under direct vision, the interval of time necessarily varying with each individual case. When the stricture is very tight, retrograde dilatation through a gastrostomy opening is used. Achalasia of the cardia, after an initial direct examination, is treated with some form of bougie passed " blindly " as often as required.

This concentration of uncommon diseases in one clinic is not only of advantage in treatment, but has enabled the physicians to observe and record very complete natural histories. The co-operation of the medical side is required to a greater extent than ever in many of these cases which are seldom fatal, and being often temporarily relieved by diet and alkalis, are frequently overlooked. In combination with the surgeon the bronchoscopist contributes to the treatment of pharyngeal pouch. The pouch, if large, is emptied by aspiration and washed clean, and this is performed perhaps twice before operation, reducing the inflammatory condition of the mucous membrane. Two days previously the patient swallows a weighted silken thread which is to pass into the stomach. Its position is checked by fluoroscopic examination. On the operating table, when the surgeon has exposed the region of the pouch, the œsophagoscopist passes the œsophagoscope along the thread until the pouch is reached which then is easily identified by the surgeon because of the light shining through its walls. It is dissected free, and its neck is defined. The œsophagoscope is passed down to the cardia, the thread cut there with a special scissors, and a rubber duodenal tube passed into the stomach. The instrument is then withdrawn over the tube leaving it *in situ*, while the surgeon proceeds to a one-stage resection of the pouch.

THE STOMACH

Since the early days of peroral endoscopy, gastroscopy has been attempted with degrees of success varying chiefly with the skill of the individual operator, but it has never been a safe procedure even in the best hands. When this risk could not be balanced by any claim of complete examination, to take it was questionable. The development, during the past three years, of a flexible gastroscope by Schindler and Wolff has removed both the criticism of danger and that of incompleteness of examination. The instrument is passed into the stomach with no more difficulty than attends the passage of the rubber stomach-tube. Views obtained through it need practice to interpret, but are extremely clear, and, using the correct technique, the whole of the interior of the stomach up to the pyloric sphincter can be seen. The physicians have collaborated whole-heartedly with the clinic, and an interesting series of cases has already been examined with satisfactory results. Other clinics in America have taken up this work, and the expatriation of Schindler to Chicago has given it a further stimulus.

CONCLUSION

It will have been noted above how the other departments of the hospital work with the Jackson Clinic, which is widely called into consultation. The initiative must always remain with the other physicians and surgeons, and to obtain their co-operation the endoscopist must demonstrate that he can be readily and easily of service. An endeavour has been made above to show how this may be achieved.

A SYSTEM OF TREATMENT OF CHRONIC RHEUMATISM

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THIS system, as employed at the clinic for rheumatism at the Bristol Royal Infirmary and for private patients, appears to give satisfactory results, and there have been a number of requests for an account of the method. To explain the rationale in full would require a long article—for chronic rheumatism should not be regarded as a disease of the joints so much as a condition which produces symptoms in the joints of a diseased person; the whole body from the corpora striata to the capillaries is affected, and a comprehensive description would require a volume. In brief, the method is directed against the three factors which are regarded as basal, namely, the endocrine, the septic, and hepatic dysfunction. The last factor may come as a surprise to some, but if the pharmacology be checked it will be seen that every single component of the system, some rubefacients excepted, has a primary action on one or more aspects of hepatic metabolism. The method is directed primarily to correction of hepatic dysfunction, and so differs from other methods.

The genesis of the system happened about fifteen years ago when an epidemic of jaundice was investigated. This was the so-called catarrhal jaundice, but its incidence was more intense among those who were being, or had recently been, treated for syphilis, this incidence being regarded as due to summation of two hepatic noxa. It was noted that as convalescence progressed a phase of chronic muscular or articular rheumatism was frequently present, but disappeared at a later stage. The next step was to test patients who had periodic bouts of rheumatism for hepatic dysfunction; it was found that serial tests gave greater positivity during the rheumatic periods than when free from pain and stiffness.

The endocrine factor.—Sub-thyroidism is frequent, and a small daily dose of thyroid extract is given to every patient; for, even when sub-thyroidism is absent, thyroid is one of the most potent hepatic stimulants. A pituitary factor is not infrequent; when present the patients tend to have frequency of micturition without any of the more usual causes; secondly, there is a peculiar deposit of adiposity about the ankles. Ovarian dysfunction with oligo-menorrhœa or amenorrhœa is common in rheumatoid arthritic patients, and must be corrected by "agomensine" with or without the addition of prolan; a rheumatoid woman seldom improves till menstruation has become more normal.

The septic factor is present in all, but as will be noted in the table on p. 695, it is variable. Dental sepsis, which is far too much blamed, tends to produce maximal finger arthritis with muscular rheumatism elsewhere. Tonsil sepsis, secondary to nasal sepsis with or without sinus suppuration and all silent as regards symptoms, is far more frequent and important. Removal of diseased tonsils in elderly patients is often a disaster, especially in rheumatism; the tonsils should be regarded as lymphatic glands for the naso-pharynx and their removal as only leading to a more ready dissemination of toxic material; surgical removal is not the only treatment possible for a septic focus, as will be seen later. Duodenal sepsis is considerably more frequent than is yet recognized, and it appears to be the most frequent of causal foci. Other septic foci are less often causal, but the gall-bladder, the cervix uteri, the urinary tract and the prostate are sometimes of importance.

In any thoroughly investigated patient several foci are usually found, and the question of surgical intervention, at present too popular, is raised; the unfortunate patient may be advised to have the antra washed out, the tonsils removed, the teeth extracted, and perhaps the gall-bladder excised at the least, and this might still leave the duodenal sepsis, probably the main focus, untouched, for I have not yet heard of excision of the duodenum for sepsis having been advised. The less surgery is employed on these patients the better will be their progress, as the sepsis will often clear up with effective treatment, but if progress fails and a focus of sepsis is suspected, a system of testing may be carried out and the convicted focus may be condemned to surgical treatment, less drastic methods having failed. Sepsis is held in check by the activity of the mobile and immobile defence cells of the body, in brief, leucocytes and macrophages, the latter being dominant. If the macrophages are temporarily inhibited, the defence mechanism lags and symptoms flare up. Such a temporary inhibition of the defence can readily be obtained by a massive dose of any electro-negative colloid, such as the sulphur colloid noted below; this is because the macrophages take up such a colloid so avidly that they become "stuffed" with it, and are then unable to exert their proper function. If therefore, an ethmoid cell, for example, is suspected, three c.cm. of the colloid should be given intravenously ; after two hours, more or less, there will appear intensification of pain and nasal, or even facial, œdema; this is interpreted as meaning that this focus is leaking and macrophage blockade has allowed an acute leakage of toxic material.

If teeth are suspected three of the worst should be removed; the absorption of sepsis from the raw surface will occasion a flare-up of rheumatism the next day if this focus is dominant. If the tonsils are questioned they should be treated by tonsil suction weekly and argyrol painting daily, which will be followed by more or less relief if they are blameworthy.

THE TYPES OF CHRONIC RHEUMATISM

Type.	Septic factor.	Endocrine factor.	Hepatic factor.
Muscular rheumatism -	Marked.	Slight.	Marked.
" Neuritis " - - -	do.	do.	do.
Rheumatoid - - -	Medium (defence poor).	Marked.	do.
Osteo-arthritis, lumbago, sciatica - - -	Slight.	Slight.	Slight.

This grouping is important as regards the dosage of colloid, and it is essential that the types are recognized. Muscular rheumatism shows pain of migrant type with localized muscular spasm, readily found on palpation. These nodes have given rise to the name fibrositis, a misnomer, for if the nodes are marked they will be found to be mobile. Neuritis is more localized with little to be found in the joints; it must be distinguished from true neuritis; in the latter rest eases pain, in the rheumatic type rest increases pain; in true neuritis warmth aggravates, in rheumatic relieves pain. Rheumatoid arthritis shows much articular and peri-articular effusions, spindle fingers and puffy wrists; the small joints being more affected and there is muscular and dermal atrophy. In osteo-arthritis there is little joint effusion, but osteophytes instead and the larger joints are the more affected; the smaller joints may show para-articular exostoses. Lumbago and sciatica are included, for, as regards treatment, they fall into this group; they only occur in patients with congenital abnormalities of the lumbar spine, with or without superimposed rheumatic spondylitis.

THE METHOD

Sepsis.—Treat conservatively so long as progress is satisfactory except in the case of accessory sinuses. Teeth: employ 10 volume peroxide as dentifrice, and give daily gum massage pressing from root to crown, then dry the gums and immediately run 20 per cent. argyrol in water along the sulci. Tonsils: nebulant of chloretone or hazeline twice daily and the ethmoid pack[1] to nose; tonsil suction once weekly, daily painting with 20 per cent. argyrol. Cervix: daily douching in dorsal position with permanganate 1/1000 warmed; weekly cervical tampons of 30 per cent. argyrol. Gall-bladder: hexamine 60 grains one hour after a large dose of alkali twice weekly; better give intravenous injection of 30 grains of hexamine in water once weekly. Urinary sepsis: mercurochrome one fluid ounce of 0·5–1·0 per cent. in normal saline, retain for one hour, intravesically once weekly; caprocol, addition of tinct. hyoscyamus to aspirin mixture, or freshly made buchu tea may be used. Duodenal sepsis: two to four drachms of unadulterated kaolin first thing in the morning before any food or drink; half an hour later drink a half to one pint of water, and no food or other drink for at least one hour. Prostate: rectal diathermy, prostatic massage.

Diet.—The liver must be spared of foods which require much " working up "; these foods are the fats and lactalbumin. Milk, cream, cheese and all milk products, butter excepted, are not permitted. It is not the fat in milk which is injurious, for butter is well tolerated; it is the lactalbumin. This is denatured in churning and in certain processes of condensation. Nestlé's sweetened condensed milk and allergilac (Cow and Gate) are well tolerated, and should be encouraged for their calcium content. The liver appears frequently to become sensitized to lactalbumin, therefore, these vetoes should be absolute. Fats, other than butter, oils and greasy things, are not allowed. Eggs allow sparingly. Red meat, sugars and starches are well tolerated, and are allowed freely. Alcohol is difficult, but is useful in moderation if tolerated; each patient should test himself by restricting himself to one type of beverage for one week at a time; the beverage which does not increase his rheumatism is tolerated. Excess weight should be reduced by diet; a common type of osteo-arthritis of the knees in women grossly overweight will not respond so long as the knees are subjected to weight in excess of that they were constructed to bear. In rheumatoid type undernutrition is common, and also must be corrected.

Orthopædic assistance is necessary, especially in the severer grades; the two lower limbs must be of the same total length, footwear included. Massage is of great assistance, but should be the deep, painful Swedish type. Thrice a week is enough for this type of massage. Baths may be obtained at home by the addition of two pint basins of the crudest veterinary Epsom salts to water kept at a temperature of 100 deg. F., lasting ten minutes at first, but longer when well tolerated. These are soothing, but should not be indulged in more than twice each week. After this bath the skin should not be rinsed with fresh water. Joint packs are of much help in superficial joints, especially knees, wrists and fingers; chloretone liniment (see p. 702) is spread on lint, covered with oiled silk, then wool and bandage; the pack is left on for one hour at first, but this time is gradually lengthened as the skin becomes tolerant. In time the pack can be left on all night, thrice weekly. Many skins are intolerant at first, and will become eczematous if not gradually broken in; no cases of permanent intolerance have been noted. Heat applications are soothing; the common saucer type of portable electric stove is accessible, cheap and effective for this purpose.

Exercise should be encouraged, as much daily as will cause definite, but mild, fatigue; if pain be present exercise should be that amount daily which causes slight, temporary increase of pain. Sleep must be adequate; an extra dose of the salicylate mixture at bedtime, or a tablet or two of phenacetin with a drink of maté infusion, is usually enough. If not some mild hypnotic should be employed, but the barbiturates should not be given, as addiction actually causes one type of rheumatism.

MEDICINAL TREATMENT

If kaolin is indicated for duodenal sepsis the day should begin with one to two teaspoonfuls of pure kaolin on waking; this is followed by half to one pint of warm or cold water half an hour later; no other food or drink whatsoever should be taken until the kaolin has had one hour to adsorb the protein-like products of sepsis in the upper intestine. At breakfast thyroid and any other endocrine indicated, radiostoleum five drops except for rheumatoids, who should have at least double, and " bemax " are taken. Immediately after breakfast the first dose of salicylate mixture. In the morning attention to joints with liniment; all affected joints are to be kneaded for as long as possible, the requisite liniment being applied to the skin. The patient should do as much of this as is practicable, for this gives exercise as well. Massage is best in the mornings. After the midday meal another dose of salicylate mixture is given. In the afternoon there should be either rest or exercise. After tea give the third dose of salicylate mixture, except in the milder cases, who reserve this dose till bedtime. During the evening there is further attention to the joints, and joint packs, except when tolerance permits the pack at bedtime. The baths should be taken just before bedtime. At bedtime give the third, or a fourth dose of salicylate mixture. This makes a full day, but this is only for the severer grades, who have no other occupation because of their illness.

Sulphur therapy.—This is not a variety of protein shock, at any rate, not with this colloid; some sulphur colloids are stabilized with peptone, in which case protein shock is probably the chief action. Some sulphur colloids act directly on the liver, increasing the hepatic glycogen; this results first in improvement of carbohydrate metabolism and corrects the intolerance for starches, secondly it helps the liver in its attempt to de-toxicate portal-carried toxins, by facilitating glycuronation. The patient should, if ambulant, put a pinch of flowers of sulphur in the foot of the sock or stocking; it is absorbed and is of assistance, but all but the milder cases require more intensive sulphur therapy. Sulphur colloid is B.R.I. colloidal sulphur, 0·5 per cent. strength (manufactured by British Drug Houses, Ltd.). In this colloid the particles consist of a sponge-like framework of metalloid sulphur, the pores being full of pentathionic acid, this latter being the active principle. Though feebly acid it attacks metal strongly, for the colloidal particles are shattered by Brownian movement and liberate the strong pentathionic acid. The initial dose is 1·0 c.cm., and it must be given as a clean intravenous injection. or it will cause intense pain lasting for several days. Intramuscular injection can be given only after adding an equal amount of special alkali, obtainable from the manufacturers; this should only be practised in the old standing cases of rheumatoid arthritis where veins cannot be found; intramuscular injections are not nearly so effective, as the colloid has not so good a chance of reaching the macrophage system. Intravenous therapy is quite easy with a little practice; all the nurses at the Bristol Royal Infirmary are trained to carry it out, and the injections at the clinic are practically all performed by the nursing staff under the supervision of the house physician.

The patient is instructed to watch for reaction the same evening or later. Reaction means a slight stir up of the joint symptoms, just enough to be definitely perceptible, and not more than enough to occasion a baddish night's sleep, with some stiffness the next day. With optimal reaction this should have passed in twenty-four hours, after which there should be a feeling of betterment and less pain and stiffness. If the first trial dose does not produce this result, increase by 0·5 c.cm. each week until reaction appears.

As colloids act by stimulating the macrophage system, and as the tonus of this cell system is always varying with the state of activity of ever present sepsis, reaction is never quite consistent. Every now and then it will be found that the dose which gave optimal reaction in previous weeks, has either given none, or more than was optimal. This does not matter, as an occasional sharper reaction does good, even in rheumatoid type. Frequent sharp reactions do not help in any type, and the patient will almost certainly fail to attend. An injection which has leaked, even slightly, will give more reaction because of the leak; this should be allowed for in assessing the degree of reaction.

Dosage for type of rheumatism.—In osteo-arthritis the infective factor is slight and the macrophage system is not under stress. In this type a few sharp reactions at the beginning of the course do good and rapidly diminish the pain. This is especially the case in lumbago and sciatica; after a smart reaction the patient is in much less pain the next day. In the osteo-arthritic group therefore, start with 3·0 c.cm., and warn the patient as to what is wanted; if reaction fails repeat with 5·0 c.cm. in four days' time. If 5·0 c.cm. fail to produce sharp reaction, add 4 minims of T.A.B. vaccine to 5 c.cm. of the colloid immediately before injecting; this is usually effective; after reaction appears inject once weekly. After three sharp reactions lessen the dose to one which gives the optimal reaction or a feeling of well-being twenty-four hours later; but, every now and then this procedure gives a sharp reaction, especially if progress is not satisfactory. In rheumatoid type reaction should be only just perceptible, for, though infection may not be marked the macrophage system appears to be defective; over-stimulation is seldom productive of anything but aggravation. In the neuritic type too, optimal reaction appears to give the best results. In the muscular type a few smart reactions, but not so severe as for osteo-arthritis, shorten the period of illness. Mild cases of neuritic and muscular type with no limitation of activity should be tried out on the medicinal treatment first, with liniment and thyroid; for the majority this is all that is needed.

The duration of colloid therapy.—A good working plan is to give sixteen weekly injections and then six to eight weeks without, unless symptoms recur sooner. Some patients, especially the severer grades, do not appreciate these holidays, and, if they desire it they can go on indefinitely. The duration of the whole treatment should last till the patient has claimed recovery for six months.

In those cases which show ankylosis, no attempt should be made to break down the joints, until it is considered that the arthritis is quite silent. Breaking down is not often required; with repeated slightly forced passive and active movements, ankylosis usually lessens. Progress is slow in the severer grades, and attempts to speed things up are usually disastrous; a patient with severe rheumatoid or osteo-arthritis is told that at least one, and probably two years of treatment will be required.

In all types sepsis is treated palliatively, but if progress is not being made, radical treatment can be considered after the main foci have been unmasked by the methods given.

In the patients with the more severe rheumatoid type progress fails in about 25 per cent., even though full treatment has been given. In this event colloidal tellurium is administered intravenously every fourth week; colloidal sulphur being used in the intervening three weeks. The patient must first be warned that brown hair will probably become blond, and that there will be a strong smell in the breath similar to an acetylene leakage. Among the hospital classes this gives rise to little trouble, they and their relatives become used to it. This smell continues for a year after the last dose of tellurium. It is an unpleasant addition, but some patients with rheumatoid arthritis do not begin to improve until it is administered. There is never any reaction with B.R.I. colloidal tellurium.

FORMULÆ AND DOSAGE

Thyroid extract: one-tenth grain, Armour's dry thyroid, unless stigmata indicate a larger dose.

Radiostoleum: one cachet, or five drops daily; in rheumatoid arthritis double this dose.

Argyrol: watery solution, 10 per cent. for nose; 20 per cent. for tonsils or gums; 30 per cent. for cervix uteri tamponage.

For superficial joints and joint packs, *Lin. chloretone co.*:—

℞ Hydrarg. oleatis	24 grains
Chlorbutol	120 minims
S.E.D. (salicylic ester di-hydroxy-ethane)	1 fluid ounce
15 per cent. lanoline in ol. olivæ to	5 fluid ounces.

For deeper joints, *Lin. terebinth. co.*:—

℞ S.E.D.	1 fluid ounce
Olei resinæ capsici	5 grains
Ol. olivæ	2 fluid ounces
Ol. terebinthinæ to	5 fluid ounces.

For lumbar spine and hips, *Lin. mordans*:—

℞ Olei resinæ capsici	120 minims
Methylis salicylatis	1 fluid ounce
Xylol	4 fluid ounces
Olei terbinthinæ	15 fluid ounces.

Mist. aspirin citrate:—

℞ Acidi acetylsalicylici-	10 grains
Sod. citratis	30 grains
Tinct. podophyll. ammon.	6 minims
Ext. nucic vom. liq.	1 minim
Emuls. menth. pip.	3 minims
Aquam dist. to	1 fluid ounce.

Note.—The amount of podophyllum should be altered to that which is adequately laxative.

Yohimbine hydrochloride should be added for patients with acrocyanosis or acro-asphyxia; it is only aphrodisiac in emetic dosage in man. The dose is one-tenth to one-sixth grain.

B.R.I. sulphur colloid, 0·5 per cent. strength, 1 to 5 c.cm., intravenously.

B.R.I. tellurium colloid, 0·4 per cent. strength, 3 c.cm., intravenously.

Reference

[1] James, J. A.: *The Practitioner,* 1933, cxxxi, 183.

THE ROYAL COMMISSION ON VACCINATION 1889—1896

By Sir WILLIAM JOB COLLINS, K.C.V.O., M.S., M.D., B.Sc., F.R.C.S.

Fellow and Late Vice-Chancellor of the University of London.

As the only survivor of the Royal Commission on Vaccination, appointed in May, 1889, which finally reported in August, 1896, I think it may be interesting and of some historical value to record some details derived from internal knowledge which might otherwise remain unchronicled. The subject referred to the Commission both medically and legally presented controversial aspects; its appointment was generally approved and its personnel was judged to be strong. Lord Herschell was acclaimed as an able and impartial Chairman: he had been Lord Chancellor in 1886, after serving as Solicitor-General under Gladstone 1880–1885, and had earned high esteem by his conduct as Chairman of the Royal Commission on London Government. Moreover, through his brother-in-law, Sir John Burdon-Sanderson, he was in touch with the medical profession and the Local Government Board. On his right, at the horse-shoe table at which we sat, was the venerable Sir James Paget, Bart., Serjeant Surgeon to the Queen, admired and beloved by all. On the rare occasions when Lord Herschell was absent, Sir James presided as Vice-Chairman. On the left of the Chair was Sir Charles Dalrymple, a Scottish Baronet and Conservative M.P. for Ipswich, who had fought Gladstone for Midlothian. On the right of the Chair, in order from Sir James Paget, were Sir Guyer Hunter, K.C.M.G., Mr. J. S. Dugdale, K.C., Mr. (afterwards Sir William) Savory, Mr. (afterwards Sir Jonathan) Hutchinson, Professor (afterwards Sir Michael) Foster and Mr. Samuel

Whitbread.

Sir Guyer Hunter's experience had been chiefly with the Army in India, and he was a Conservative M.P. for a metropolitan constituency. Mr. (afterwards Sir William) Savory was Senior Surgeon at St. Bart's, President of the Royal College of Surgeons and had been a critic of Listerism and the germ theory. Mr. Dugdale, K.C., was a Conservative M.P. for a Warwickshire constituency. Mr. (afterwards Sir Jonathan) Hutchinson, of Quaker ancestry, was Lecturer on Surgery at the London Hospital, and in 1889–90 President of the Royal College of Surgeons. Professor (afterwards Sir Michael) Foster, Secretary of the Royal Society, was the well-known Professor of Physiology at Cambridge. Mr. Samuel Whitbread, for many years Liberal M.P. for Bedford, was at one time likely to become Speaker of the House of Commons, and was recognized as a great authority on procedure. On the left of the Chair, beyond Sir Charles Dalrymple, there were seated, in order, Sir Edwin Galsworthy, Dr. Bristowe, Mr. Meadows White, K.C., Mr. Bradlaugh, M.P., myself and Mr. Allanson Picton, M.P. Sir Edwin Galsworthy was Chairman of the Metropolitan Asylums Board. Dr. Bristowe was Physician to St. Thomas's Hospital and author of the standard textbook on medicine, Mr. Meadows White, K.C., was a leading authority on all questions of local government. Mr. Bradlaugh was the well-known M.P. for Northampton, repeatedly ejected for refusing to take the Oath and as repeatedly re-elected. He requested that he might sit next to me "to keep him right on medical terms," and on my left was Mr. Allanson Picton, M.P. for Leicester, which had been the chief centre of opposition to the Vaccination Laws.

The Commission sat for seven years and examined 187 witnesses at 136 sessions. Its place of meeting was originally on the first floor of 7, Richmond Terrace; later it moved to 8, Great George Street, and finally to 7, Whitehall Place. Mr. Bradlaugh died in 1891 and his place was taken by Mr. John Albert Bright the son of Mr. John Bright; Sir William Savory and Dr. Bristowe died at later periods and their places were not filled.

PROCEDURE AND REPORT

The Commission did not sit in public but it reported the evidence taken on five occasions and these reports were published.

The first report was published in August, 1889, a volume of 132 pages containing the evidence of Sir John Simon, Dr. Wm. Ogle, Dr. R. Thorne-Thorne and Dr. Rauch, with appendices. The second report appeared in May, 1890, containing 313 pages of evidence of 43 witnesses, with appendices. The chief witnesses were Dr. Barry on the Sheffield epidemic, Dr. Gayton, Dr. Cory, Dr. Creighton, Dr. McCabe, Dr. Grimshaw, Staff Surgeon Preston and Brigade Surgeon Nash, in addition to many witnesses who had suffered penalties and imprisonment under the Vaccination Acts. A third volume of 231 pages appeared in August, 1890, and was composed chiefly of the evidence of opponents of vaccination, including Professor Alfred Russell Wallace, Mr. Alexander Wheeler, and Mr. William Tebb. A fourth report of 519 pages, containing evidence from Leicester, led by Mr. J. T. Biggs, as well as 9 days' hearing of Professor Edgar March Crookshank (who had recently published a two-volume work on "The History and Pathology of Vaccination,") was published in July, 1891.

On April 21, 1892, after 90 sessions of the Commission and the examination of 135 witnesses, a fifth or interim report was presented to Her Majesty. It stated that though unable to pronounce an opinion on the larger questions submitted to it, it might be in the power of the Commissioners, without prejudice to the inquiry still in progress, to make recommendations with reference to certain subsidiary questions. First, as regards repeated penalties for non-compliance the Commissioners say, "We think that they should cease to be inflicted altogether." Secondly, they found "that persons imprisoned under the Vaccination Acts should no longer be subjected to the same treatment as criminals." The report was signed by every member of the Commission, although some reluctance was shown by at least two members when it was first debated at a session on April 6, 1891; they thought such an interim report exceptional and that it was perhaps too indulgent to the conscientious objector, although the noble Chairman had hinted that he would be prepared to go further in letting down the honest objector.

> Lord Herschell had evidently been impressed by the long series of witnesses which had appeared before us, including some who had been fined 10, 20, 30 and more times for non-vaccination. On many heavy fines had been imposed and, in default, some had suffered distraint on their goods or had been imprisoned as criminals, wearing the prison dress, sleeping on the plank bed, and picking oakum.

There was no doubt that the recommendations contained in this our fifth report were the result of Lord Herschell's own strong opinions. I had urged him to include recommendations against the vaccination of infants of a few days old in Poor Law institutions, and also against requiring vaccination of pupil teachers, otherwise qualified, before appointment. I gathered from a letter which he wrote me that he would be prepared to approve such recommendations but did not think that he could secure unanimity upon them.

The sixth report, the most bulky of all, running to 980 pages, priced at 14s. 3d., was published on

February 14, 1896, and intimated that the final report was then under consideration. It contained the evidence of 83 witnesses taken at 62 sessions; those who occupied more than one day were Dr. McVail, Dr. Barry, Dr. Whitelegge, Dr. Bridges, Dr. Hime, Dr. Beaven Neave Rake, and Mr. Alexander Wheeler. Unfortunately this bulky volume was not provided, as the others had been, with an index.

The last day on which the Commission sat for taking evidence was December 13, 1893, when Dr. R. A. Birdwood, the Medical Superintendent of the smallpox hospital ships of the Metropolitan Asylums Board, was examined and the last question put was numbered 31,398.

At our eighteenth session we had been invited to make a personal examination of two children who were alleged to have suffered from the effects of vaccination. Some of the Commissioners, including Sir James Paget and myself, were requested to examine and report. It was, however, considered neither practicable nor expedient to pursue the same course in the many other cases of alleged injury which were reported. Dr. (afterwards Sir Thomas) Barlow, Dr. T. D. Acland, Dr. Sidney Coupland, Dr. A. P. Luff and Dr. T. D. Savill were accordingly appointed by the Commission, with the sanction of the Treasury, to make the necessary investigations. It was also deemed advisable to make inquiry, on behalf of the Commission, into certain local outbreaks of smallpox which took place during the sitting of the Commission. Inquiries were accordingly made by Dr. Coupland, Dr. Luff and Dr. Savill into outbreaks in London, Dewsbury, Leicester, Warrington and Gloucester. Dr. Coupland also reported, in less detail, on outbreaks in Glasgow, Liverpool, Salford, Oldham, Leeds, Sheffield and Halifax. These reports appeared as Appendices to the sixth report though published separately under Command numbers C. 8609 to C. 8614 inclusive. The reports by Drs. Coupland and Acland on "cases in which death or non-fatal injury was alleged or suggested to have been caused by, or otherwise connected with, vaccination" appeared as Appendix IX to the sixth report. It occupied 453 pages and dealt with 421 cases including 19 groups of cases numbered each as one.

THE FINAL REPORT

It was on March 20, 1895, that the Commission met to consider its final report.

The original reference to the Commission of May 29, 1889, was to inquire and report as to :—

1. The effect of vaccination in reducing the prevalence of, and mortality from, smallpox.
2. What means other than vaccination can be used for diminishing the prevalence of smallpox, and how far such means could be relied on in place of vaccination.
3. The objections made to vaccination on the ground ot injurious effects alleged to result therefrom; and the nature and extent of any injurious effects which do, in fact, so result.
4. Whether any means, and, if so, what means should be adopted for preventing, or lessening, the ill effects, if any, resulting from vaccination; and whether, and, if so, by what means, vaccination with animal vaccine should be further facilitated as a part of public vaccination.
5. Whether any alterations should be made in the arrangements and proceedings for securing the performance of vaccination, and, in particular, in the provisions of the Vaccination Acts with respect to prosecutions for non-compliance with the law.

Lord Herschell intimated that he would be unable to draft the whole report himself. He proposed, therefore, to allot certain sections to certain members :—

(*a*) The scientific and historical part to Professor Foster; (*b*) the statistical part to Sir James Paget; (*c*) the alleged injuries due to vaccination to Mr. Hutchinson; (*d*) means other than vaccination to myself. The Chairman undertook, after consideration by the Commission of these sectional reports, to weld them into a whole and deal with administration of the present law and any reforms of it that should be recommended.

We set to work on our allotted tasks but, I gathered from Lord Herschell, that Sir James Paget, who was then eighty-one, found the portion referred to him rather too heavy and he was relieved of it by the Chairman. The drafts took some time to prepare and when sent in were set up in proof, and distributed to all the Commissioners for consideration and criticism. The first discussion of importance arose over paragraphs in Professor Foster's draft, which dealt with: (1) the value to be placed upon Woodville's and Pearson's series of vaccinations at the smallpox hospital, the subsequent inoculation of the vaccinated, and the nature of the lymph widely distributed from this source; and (2) the value to be placed on the variolous test as practised on the vaccinated in the early days of vaccination. The criticisms which I submitted on 13 paragraphs in Professor Foster's draft subsequently came to be embodied in paragraphs 38 to 62 of what became a minority report. These questions were referred to Professor Foster and myself to endeavour to prepare an agreed statement. Several meetings were held at my house by the two of us; some amendments were agreed in the original draft, several paragraphs were to be deleted and others substituted, while two appendices, to be found on pages 143 to 153 of the volume containing the final report, were subsequently compiled by Professor Foster, dealing with: (A) the variolous test and (B) Woodville's cases. New paragraphs 21 to 27 were inserted in what became the final (majority) report. This rift was the starting point from which, when the question of changes in the law came to be considered, it became clear that a unanimous report was out of the question.

The draft which, at the request of Lord Herschell, I had prepared on "Means other than vaccination which can be used for diminishing the prevalence of smallpox" was largely adopted and incorporated, with some modifications and other matter introduced by the Chairman, in the final report, paragraphs 451–507. When we came to consider the last head of our reference, viz. what changes, if any, should be made in the law in regard to compulsory vaccination, there was a well-marked difference of opinion. While none of the thirteen surviving members of the Commission were in favour of continuing the existing law, with repeated penalties for non-compliance, and the treatment of objectors when committed to prison as criminals, two, Sir Guyer Hunter and Mr. Jonathan Hutchinson, were not prepared to go as far as the Chairman and the majority in permitting conscientious objectors to escape, and they favoured compulsory revaccination at the age of 12. Mr. Samuel Whitbread, Mr. J. A. Bright, Mr. Allanson Picton and myself expressed "dissent from the proposal to retain in any form compulsory vaccination." The two former, however, were not otherwise prepared to dissent from the final report of the majority, which they accordingly signed. This report recommended that an objector should either satisfy the local authority of the honesty of his non-compliance or make a statutory declaration to that effect, and that in either case no proceedings should be taken against him.

MAJORITY FINDINGS

The findings of the majority of the Commission on the first head of the reference was :—

"We think (1) That vaccination diminishes the liability to be attacked by smallpox. (2) That it modifies the character of the disease, and renders it (*a*) less fatal, and (*b*) of a milder or less severe type. (3) That the protection it affords against attacks of the disease is greatest during the years immediately succeeding the operation of vaccination. It is impossible to fix with precision the length of the period of highest protection. Though not in all cases the same, if a period is to be fixed, it might, we think, fairly be said to cover in general a period of nine or ten years. (4) That after the lapse of the period of highest protective potency, the efficacy of vaccination to protect against attack rapidly diminishes, but that it is still considerable in the next quinquennium and possibly never altogether ceases. (5) That its power to modify the character of the disease is also greatest in the period in which its power to protect from attack is greatest, but that its power thus to modify the disease does not diminish as rapidly as its protective influence against attacks, and its efficacy during the later periods of life to modify the disease is still very considerable. (6) That re-vaccination restores the protection which lapse of time has diminished, but the evidence shows that this protection again diminishes, and that to ensure the highest degree of protection which vaccination can give, the operation should be repeated at intervals. (7) That the beneficial effects of vaccination are most experienced by those in whom it has been most thorough. We think it may fairly be concluded that where the vaccine matter is inserted in three or four places, it is more effectual than when introduced into one or two places only—and that if the vaccination marks are of an area of half a square inch, they indicate a better state of protection than if their area be at all considerably below this."

As regards the alleged injurious effects of vaccination, the finding of the majority was " That although some of the dangers said to attend vaccination are undoubtedly real and not inconsiderable in gross amount, yet when considered in relation to the extent of vaccination work done they are insignificant."

Recommendations were made that parents should not be required to submit their children to vaccination by means of any but calf lymph, that the vaccination of infants only a few days old (except where there is obvious danger of contagion) should be deprecated, and that the operation should be carried out, as a rule, not at public stations, but at the homes of the children.

MINORITY REPORT

The minority report, signed by Mr. Allanson Picton and myself, somewhat pedantically described as our " Statement of Dissent," extends over 65 pages; it will be sufficient to quote its first and last paragraphs as generally indicating its *raison d'être*.

"(Par. 1.) We entirely agree with the Report of our colleagues in so far as it shows the great change of professional and scientific opinion since vaccination first engaged the attention of the Legislature, and since the passing of the first compulsory Act in

1853. We hold with them that the prophylactic power of vaccination has been at least exaggerated, and that the dangers incidental to the practice, though at one time denied, 'are undoubtedly real and not inconsiderable in gross amount.' We gladly added our signatures to theirs in support of the Commission's interim report recommending the abolition of repeated prosecutions, and also that recalcitrants against the vaccination laws should no longer be subjected to the same treatment as criminals. We now desire also, if compulsion in any form is to be maintained, to support their final recommendations for the relief of conscientious non-conformity with the law. We also gladly endorse the precautions they recommend with the object of preventing avoidable dangers in connexion with the operation. There is no difference among us on these points; so far as these recommendations go the Commission is absolutely unanimous. We feel, however, that the evidence not only justifies but requires a more complete reconsideration of the present state of the law as well as of the methods adopted in dealing with smallpox. For this purpose it is necessary to review in some detail the history of smallpox and the various preventive measures which have at different times been in vogue and to scrutinize the grounds on which one alone of these preventive measures has been relied on to the exclusion of others. We desire also to give our reasons for thinking that other more effective and practicable (as well as less objectionable) modes of stamping out smallpox, or protecting communities from its introduction, are available. We venture to think that the report of our colleagues, in the preparations of many portions of which we have borne our part, has approached the consideration of the behaviour of smallpox and the means of preventing it, too exclusively from the standpoint of vaccination, and that too little attention has consequently been accorded to sanitary organization, prompt notification and isolation, measures of disinfection and cleanliness, and healthy conditions of living, which we believe to be of the first importance in preventing and controlling outbreaks of smallpox."

The final paragraph (No. 303) says:

"On the whole, then, while there is much in the report of our colleagues from which we dissent, and we have accordingly abstained with reluctance from adding our signatures to theirs, we are at one with them in holding that it is unwise to attempt to enforce vaccination on those who regard it as useless and dangerous. We, however, go further and agree with our colleagues, Mr. Whitbread and Mr. Bright, that it would be simpler and more logical to abolish compulsory vaccination altogether."

From many conversations I had with Mr. Bradlaugh before his death, I have reason to believe that he would have added his signature to the "statement of dissent" signed by Mr. Picton and myself.

PRACTICAL NOTES

PLANTAR WARTS, COLLOSITIES AND CORNS

In discussing thickenings, localized and diffuse, of the sole of the foot, R. O. Stein (*Wiener klinische Wochenschrift*, September 6, 1935, xlviii, 1118) distinguishes between physiological and pathological conditions. The former are painless and represent protective changes over normal pressure points. Pathological areas of hyperkeratosis occur frequently over points of abnormal pressure (flat foot, ill-fitting shoes) and for the most part are painful. J. J. Eller (*American Journal of Surgery*, September, 1935, xxix, 444) dealing with the same subject summarizes the treatment of each type of lesions. For callus he recommends trimming it as thin as possible, following by the application of a 40 per cent. salicylic acid paste. Trichloracetic acid applied cautiously to the affected skin may be also recommended, while for persistent cases radium or X-rays may be used. For corns, Eller suggests, first, removal of the cause (corrected shoes, dealing with foot deformities), and then conservative methods, such as soaking the corn frequently in hot water, paring it with a knife and then applying trichloracetic acid to cauterize the centre. Stein remarks that warts of the foot are becoming more common, and this he attributes to the increasing popularity of sun and sea bathing whereby the bare foot has more opportunity of being infected by the virus responsible for warts. Eller thinks the best treatment for plantar warts is electrocoagulation after anæsthetizing with novocaine. This latter is important as Stein stresses the extreme degree of sensitivity to pain on pressure of the tissues immediately around a wart. This author adds to a long list of remedies the use of carefully screened X-rays, and also records the use of a "vaccine," prepared by extracting what is presumably the infecting agent from the wart itself.

BURNING TONGUE

Subjective symptoms of burning, itching, stinging or soreness of the tongue without any pathological changes visible to the naked eye are sometimes termed "glossodynia" or "glossopyrosis." According to H. Fox (*New York State Journal of Medicine*, September 1, 1935, xxxv, 881) the condition is frequently neurotic in origin but before this conclusion is reached it is important that the blood should be examined to exclude any severe disorder since a "sore" tongue may be an early complaint in pernicious anæmia. Disturbances of gastric secretion and the part played by local irritants (hot or highly spiced foods, tobacco, dental conditions) have also to be considered. After excluding all such causes Fox deals with "burning tongue" as a more or less isolated complaint. The abnormal sensation usually affects the tip, or one or both sides of the anterior two-thirds of the tongue: it is more or less continuous, does not interfere with sleep and is usually diminished or may cease altogether on eating. The majority of patients are middle-aged women with a neurotic tendency. Treatment consists primarily in assuring the patient that the disease has no relation whatever to cancer. Instructions are given to stop the use of tobacco, alcohol, highly spiced food, and excessively hot food and drink. A diet of plain food should be ordered and constipation corrected. Teeth should be put in good order and a mouth wash of tincture of myrrh and boracic acid ordered. Fox also recommends X-ray treatment at weekly intervals to the affected part of the tongue, freely admitting that the favourable results may be the result of auto-suggestion.

IMMUNE GLOBULIN FOR MEASLES

Based upon the immunity of the new-born baby to measles, the method of using a placental extract in the treatment, modification and prevention of this disease has been attracting attention in recent months. I. M. Levitas (*Journal of the American Medical Association*, August, 17, 1935, cv, 493) records the results obtained with the globulin fraction of a saline extract of placentas obtained from healthy women with negative Wassermann and Kahn tests. Twenty-eight cases of measles were treated with a single intramuscular injection of 1 to 2 c.cm. of this globulin preparation, and in twenty-five of these it is claimed that " excellent " results were obtained as regards the course of the disease. Used to modify an attack of measles after exposure to infection had occurred, 2 c.cm. of the globulin solution were given intramuscularly, and while mild modified measles occurred in thirteen out of eighteen patients and complete protection was secured in two, the number of cases was too small for deductions to be made, especially regarding the time of injection after exposure. In order to prevent measles altogether in a hospital ward when a child developed measles after having been for two days in the ward, all the remaining twelve patients were given 3 c.cm. of globulin solution and no further case resulted. Although in the series of patients here summarized, local and febrile reactions, while not uncommon, were never serious, there is this aspect of the matter to be considered. A preliminary report of the Council on Pharmacy and Chemistry of the American Medical Association (*ibid.*, 510) and an editorial comment (*ibid.*, 514) both agree that, while the immunizing effects of placental extracts appear promising, difficulties about purification and standardization must be overcome before its use can become general.

ANÆMIA AND ANGINA PECTORIS

Various authorities have commented upon the occasional association of severe anæmia with attacks of anginal pain. C. Lian and P. Marchandise (*Revue belge des sciences médicales*, Aug.–Sept. 1935, vii, 509), in confirming this, recount the clinical findings in eight patients who had this association, representing an incidence of a little over one per cent. of the total number of patients who had come under their observation with angina pectoris. While the problem of the pathogenesis of anginal pain in severe anæmia is still unsettled, the practical conclusion to be drawn from studies of the subject is that effective treatment of the anæmia, according to its type, may lead to a complete cessation of anginal attacks. Amelioration in symptoms may be associated with changes in electrocardiographic tracings indicating improved conditions in the myocardium.

ERGOTAMINE TARTRATE IN THE PUERPERIUM

Arguing that better contraction of the uterus after labour means decreased risks of maternal morbidity, M. G. DerBrucke (*Journal of the American Medical Association*, September 14, 1935, cv, 867) reports the use of ergotamine tartrate instead of pituitary extract. A large series of patients have now been treated as follows:—Immediately after delivery of the placenta one ampoule (about 1 c.cm.) of ergotamine tartrate was given hypodermically. Beginning on the first day after delivery and during the succeeding three days each patient was given daily 2 c.cm. of the alkaloid solution by mouth in doses of 0.4 c.cm. given between 6 a.m. and 10 p.m. Careful records were kept of the height of the fundus uteri, temperature and character of the lochia. Compared with control patients and with those receiving pituitary extract after delivery of the placenta, the series of patients here reported gave very favourable results. There was a more rapid decrease in size of uterus, a diminished lochia (absent in 60 per cent. by day of discharge from hospital) and a corrected morbidity rate was only 2·25 per cent. It is claimed that a mildly tonic contraction of the uterus is produced and maintained by the ergot preparation used.

SEDATIVES FOR HEAD INJURIES

Despite the statement by experts that in the restlessness secondary to cerebral trauma morphine should at all costs be avoided, there are many practitioners who do not support this view. The main objection to morphine for patients with head injuries is that it depresses the respiratory centre, sometimes excites the patient and may hasten a relapse into unconsciousness. G. Phillips (*Medical Journal of Australia*, July 27, 1935, ii, 108) reports a series of investigations designed to illustrate the bad effects of morphine and to determine what alternative sedatives may be safely used. The experiments clearly showed that morphine in a dose having but little effect upon a normal animal will produce signs of respiratory failure if it is preceded by even a slight degree of cerebral trauma. It is urged that the early treatment of restlessness due to head injury should be by dehydration methods (hypertonic salines) and not by drugs. If sedatives are required in addition, a drug should be selected which has as little depressant action on the vital centres in the hind brain as possible. On theoretical grounds Phillips suggests that dial (Ciba) represents a suitable preparation and its value in cerebral restlessness is under further investigation.

POTASSIUM PERMANGANATE IN POISONING

The recommendation of the use of potassium permanganate in certain cases of poisoning is generally followed by some vague statement as to the colour or concentration of the solution to be used. According to R. A. Hatcher (*Journal of the American Medical Association*, August 17, 1935, cv, 502) even fairly dilute solutions of this substance are irritant, concentrated solutions are caustic, and a large dose may cause death. It is therefore of importance to restrict the use of this antidote to poisoning by those substances for which it can be proved to be effective. Hatcher includes in his list aconitine, amidopyrine, morphine, strychnine and, in alkaline solution, hydrocyanic acid and the cyanides. Potassium permanganate should not be depended upon to destroy all the poison, and its use should be followed by evacuation of the stomach. It should be given by mouth in concentrations of 1 in 2,000 to 1 in 5,000 and a solution of 1 in 5,000 can be used for washing out the stomach. According to Hatcher there is no justification for the intravenous, subcutaneous or intramuscular injection of potassium permanganate for the destruction of any circulating poison. It is useless (by any route) in cases of poisoning by atropine, cocaine and yellow phosphorus. It may be useful in washing out the stomach after poisoning by alurate, dial and possibly some other sedatives, but not after barbital, luminal, amytal, neonal, sulphonal or chloral poisoning. It may be useful for washing out the stomach in cases of poisoning by phenol or creosote but it cannot be administered safely in sufficient amounts to decompose an otherwise fatal dose of either.

PROTEIN THERAPY FOR SEPTIC SORE THROATS

A series of patients with septic sore throats have been treated by Ch. Richet and J. Borgida (*Progrès médical*, September 21, 1935, lxiii, 1509) by means of non-specific protein therapy. For this purpose they have used the preparation "dmelcos," a vaccine prepared from Ducrey's bacillus. As soon as a patient with a septic sore throat has come under observation a dose of 225 million organisms of the dmelcos vaccine has been given intravenously. In many instances this has been sufficient to produce a rapid amelioration of symptoms and of the local condition. Usually it has been necessary to give a second injection of 335 million organisms and very rarely a third dose of 450 million. In a series of ten cases there was complete failure to secure any benefit in two, but the others all responded well. Vincent's angina affecting the tonsils, severe tonsillitis without exudate and septic conditions of adjacent structures (epiglottis, nasal sinuses) have also been favourably influenced by this form of therapy.

ARGUMENTS AGAINST CIRCUMCISION

In many quarters it appears to be becoming a common practice to advise routine circumcision of new-born male infants during the period of hospitalization of the mother. F. von der Bogert (*Archives of Pediatrics*, August, 1935, lii, 562) protests against this " when simple retraction, with release of adhesions, will and does, in most instances, accomplish all that can be expected from operation without its concomitant dangers and without the comparatively frequent complications which appear in later infancy and which are unquestionably often due to loss of the natural protection of the foreskin." One of the main points in the arguments against circumcision is that during the period when napkins are still being worn, inflammation of the glans penis and especially of the urinary meatus, due to "ammoniacal" changes, can be avoided if the foreskin is still present to protect the more delicate mucous membrane beneath it. Most of the reasons put forward in favour of circumcision can be met by securing that the foreskin is loose enough to be retracted, and that cleanliness is adopted as a routine for this part of the body. Definite indications, such as an abnormally small preputial orifice interfering with outflow of urine, must receive serious consideration, but even in such cases it is pointed out that a "dorsal slit," together with an "inferior slit" alongside of the frænum may retain a protective foreskin and relieve phimosis.

INSULIN IN CIRRHOSIS OF THE LIVER

Several physicians have reported the beneficial effects of the combination of a high carbohydrate diet and insulin in the treatment of cirrhosis of the liver. J. E. Walter and W. D. Wood (*Journal of the American Medical Association*, July 20, 1935, cv, 196) record striking benefit obtained in a patient aged 48 with a severe degree of ascites necessitating repeated tappings. Injections of insulin were begun with 5 units before the midday meal and increased up to 15 units three times a day. This dosage was continued for a period of slightly over three months and during this time the patient followed a diet containing approximately 400 grammes of carbohydrate daily. The patient was trained to administer his own insulin and no reactions occurred. After about two months of this treatment the interval between tappings of the abdomen began to lengthen and the last tapping was actually made in May 1934. The total duration of the ascites was then about thirty-two months, and he had been tapped an equal number of times. Seen again in December 1934 the patient no longer showed any evidence of fluid in the abdomen and he has since resumed his occupation as a carpenter.

CARBOLIC ACID FOR ANTHRAX

Although cases of anthrax of the skin or malignant pustule are not common in this country a simple method of treatment may prove valuable when special serum is not easily available. G. C. Dorling (*Chinese Medical Journal*, July, 1935, xlix, 662) records his successful experiences with carbolic acid. This is an old method which is recommended for its cheapness and simplicity. A watery solution of 5 per cent. phenol is used: injection of 2 to 3 c.cm. through two to four punctures around and into the base of the pustule is made and a simple dressing applied. The patients are treated as out-patients and on the day following the injection if any part of the pustule shows signs of progressing a further injection is made into this area. Often only one, usually two and occasionally three or more injections are required and for a large pustule as much as 5 c.cm. may be necessary for the initial dose. It can be combined with the administration of anti-anthrax serum or with N.A.B. (0.6 gm.) intravenously if the local condition appears to be at all serious.

REVIEWS OF BOOKS

Urology in General Practice. By ALEX. E. ROCHE, M.D., M.Ch., F.R.C.S. London: H. K. Lewis & Co., Ltd., General Practice Series, 1935. Pp. xii and 356. Coloured plates 3. Figs. 40. Price 17s. 6d.

Infections of the Urinary Tract. By T. E. HAMMOND, F.R.C.S. London: H. K. Lewis & Co., Ltd., 1935. Pp. x and 250. Figs. 3; charts 3. Price 10s. 6d.

THE first of these two volumes, which is gracefully dedicated to the author's former chief, Sir John Thomson-Walker, is finely illustrated and carefully documented. It consist of ten parts, the last of which is devoted to a summary of recent advances in urological treatment, such as that of malignant disease by radium, pre-sacral neurectomy for paralysis of the bladder, sympathectomy for nephralgia of obscure origin, new urinary antiseptics, the ketogenic diet in *Bacillus coli* infections, perurethral operations for prostatic obstruction, and the improved results of orchidopexy for incompletely descended testis. Without any conservative tendency these are critically considered so as to steer a safe passage through the new and doubtful currents of urology. The influence of cystoscopy and excretion pyelography on the modern treatment of urinary disease is well brought out in other parts of this well-written book, which combines the results of much personal experience with a good knowledge of the literature. It is pointed out that cystoscopy is within the powers of every general practitioner who can pass a catheter, and that he should be encouraged to perform it when opportunity allows rather than waste time, for example, by treating hæmaturia symptomatically. There are chapters dealing with varicocele, diseases of the testis and tunica vaginalis, and an admirable summary of torsion of the hydatid of Morgagni which, in the past, has generally been regarded as spontaneous acute or subacute epididymo-orchitis.

Mr. Hammond, who has the pen of a ready writer, wishes his new book to be regarded as a series of talks at the bedside to practitioners, and consequently there is not much reference to the contributions of others. Attention is drawn in the preface to his published book on *Principles in the Treatment of Inflammation*, and stress is properly laid on the influence exerted by constitution on the character of morbid reactions, for example, in gonorrhœa, and in an appendix references are given to the views of Sir James Paget, Sir J. Hutchinson, Sir A. E. Garrod, and Professor Ryle. There is much information, for example about "marriage bed pyelitis," of a thoroughly practical kind in these chapters, many of which have been previously published.

Hæmochromatosis. By J. H. SHELDON, M.D., F.R.C.P. Oxford Medical Publications. London: Humphrey Milford, 1935. Pp. xii and 382. Figs. 41. Price 25*s*.

THIS is a fine monograph based on an analysis of 311 cases regarded as authentic, and forming the basis of the Bradshaw lecture which the author delivered before the Royal College of Physicians of London in November, 1934. The amount of labour involved in this complete survey of what has been written on this much discussed subject has obviously been enormous; thus this form of pigmented cirrhosis of the liver has been very rarely recorded in females, but the author collected 25 reports and excluded just under half of them. The numerous hypotheses put forward, such as a primary diabetes mellitus, an exaggerated form of ordinary portal cirrhosis hæmolysis, toxæmia of bacterial origin, alcoholism, copper, unknown toxins, and metabolic disorder, to explain its causation are critically discussed in a masterly manner. The author, with attractive diffidence, suggests that, while the entrance of iron into the cells of the organs which show hæmochromatosis is unimpeded, there is some abnormality in its removal from the cells thus causing the characteristic retention of iron, the relation of iron to the cells resembling that of the lobster to the lobster-pot—easy to get in but supremely difficult to get out. Clinically the liver is enlarged in more than 90 per cent. of the cases, ascites is common as a terminal event, and death in the past frequently due to diabetic coma, but with insulin, this should be prevented. So far X-ray examinations of the liver, which contains so much iron, have been disappointingly negative as an aid to diagnosis.

The Treatment of Diabetes Mellitus. By ELLIOTT P. JOSLIN, M.D., with the co-operation of H. F. ROOT, M.D., PRISCILLA WHITE, M.D., and ALEXANDER MARBLE, M.D. Fifth Edition, revised and rewritten. London: Henry Kimpton, 1935. Pp. 620. Illustrated. Price 28*s*.

PROFESSOR ELLIOTT JOSLIN'S well-known treatise embodies his wide experience since 1898, and the care of more than thirteen thousand patients, of whom a thousand were children and three hundred medical practitioners. During this century the previous editions have set out as dominant methods of treatment those associated with the names of Naunyn, F. M. Allen and Banting. Prominent features in these editions have always been the thoroughly practical character of the directions, the wise and essentially humane touches, and the wealth of personal observation. These are well maintained, but in the present edition a considerable change in the nominal authorship appears, though the presiding genius and influence must be the same; Professor Joslin has called into collaboration a number of his colleagues and assistants, the chief of whom are mentioned on the title page. This is in agreement with his declared opinion that new knowledge about this disease has, since the time of Paracelsus, always been provided by young workers. The important section on the etiology and prevention of diabetes is now entrusted to Drs. Priscilla White and Gregory Pincus, who confirm their chief's insistence on the causal importance of obesity and overweight. In the chapter on the physiology of the disease and in a special chapter on clinical disorders of the endocrine organs complicating diabetes a great deal of new material has been included. Dr. Shields Warren contributes to the account of the pathology and causes of death, and Dr. W. R. Jordan to the section on the nervous and mental complications. The influence of insulin on the outlook in juvenile diabetes, which was previously so well presented by Professor Joslin is now given over to Dr. Priscilla White who recently published a valuable monograph on the subject.

Clinical Atlas of Blood Diseases. By A. PINEY, M.D., M.R.C.P. and STANLEY WYARD, M.D., M.R.C.P. Third Edition. London: J. & A. Churchill, Ltd., 1935. Pp. xvi and 110. Illustrations 38 (34 in colour). Price 12s. 6d.

THIS number of Churchill's Empire Series has already established its popularity since the first edition five years ago. Based, like an atlas, essentially upon a series of beautifully produced colour plates, the book's running commentary is straightforward and clinically inclined in its outlook. The practitioner will find the volume helpful in understanding the modern conceptions of blood disorders, admittedly confusing in many aspects and with a terminology not yet by any means static. A glossary in the early part of the book makes things easy in this respect and despite the author's explanation of the reason for the omission, an index would add to the value of the book for many readers.

Handbook of Physiology. By the late W. D. HALLIBURTON, M.D., LL.D., F.R.C.P., F.R.S. and R. J. S. MCDOWALL, M.B., D.SC., F.R.C.P.E. 34th edition. London: John Murray, 1935. Pp. xi and 971. Coloured plates 4. Illustrations 382. Price 18s.

A BOOK which was first published in 1848—originally compiled by W. S. Kirkes, in large part from the lecture notes of James Paget—and now in its thirty-fourth edition, certainly needs no introduction and criticism is disarmed by the publishing triumph which has secured such a remarkable continuity in physiological dogma. The present-day medical student's problems are considerably increased by the rapid advances in the subject, but Prof. McDowall has done everything possible to make things as easy as possible by a skilful use of dark type for certain basic numerical facts which must be memorized and the choice of illustrations, especially the histological preparations, serves to enhance the value of the well-written text. Despite a large amount of alterations the bulk of the book has not been increased and the author must be congratulated on keeping the ever-popular "Halliburton" (as the present generation of students are bound to call this book) within the thousand pages. The general production is of a high level and the price surprisingly modest.

Anatomy: Descriptive and Applied. By HENRY GRAY, F.R.S., F.R.C.S. Twenty-sixth edition. Edited by T. B. JOHNSTON, M.B., CH.B. London: Longmans, Green & Co., 1935. Pp. xxxii and 1516. Illustrations 1,323, of which 611 are coloured. Price 42*s*.

MEDICAL textbooks rapidly get out of date and survive for varying periods by fresh editions, and in notable examples, with fresh editors; thus Kirkes' "Handbook of Physiology," which first appeared in 1848, eventually became an entirely new work except for Kirkes' name on the outside cover. "Gray's Anatomy," first published ten years after Kirkes' "Physiology" still retains 104 of the original illustrations. Its present edition shows some important changes; the revised nomenclature, approved by the Anatomical Society of Great Britain and Ireland in June, 1933 (British revision = B.R.), is given in a glossary and is employed in the text. The section on osteology, which follows those on histology and embryology, has been largely rewritten in order to be more suited to the needs of the junior student. The illustrations, which are nearly as numerous as the pages, have been carefully considered with the result that a number of the old ones have been discarded and 103 new ones added.

The Chemical Control of Conception. By JOHN R. BAKER, M.A., D.Phil. With a chapter by H. M. CARLETON, M.A., D.Phil. London: Chapman and Hall, Ltd., 1935. Pp. x and 173. Figs. 8. Price 15*s.*

DR. JOHN BAKER, who is lecturer on cytology in the University of Oxford, here sets out the results of nearly seven years' work on a search for the ideal contraceptive which shall be both infallible and harmless to the user. This well-printed volume begins with a historical survey of scientific chemical contraception which started in 1854 with the zoologist Kölliker who had been the first to prove that sperms were not parasites but true sexual elements or germ cells. In spite of this comparatively early start, little has been added until quite recently; within the last decade two organizations, the Birth Control Investigation Committee, for which Dr. Baker has worked, and the Committee on Maternal Health in the United States have organized laboratory research. Dr. Carleton who has worked in close association with Dr. Baker contributes a chapter on the morbid changes which may be produced experimentally by chemical contraceptives. Working with Professor Florey, before the latter came to Oxford, Dr. Carleton found that quinine-urea hydrochloride was definitely harmful; it induced necrosis and sloughing of the endometrium in 24 hours, and it is pointed out that the inclusion of a paste or jelly between the os uteri and a cervical cap is potentially dangerous. The conclusion is reached that the combination of a really potent chemical contraceptive with complete freedom from pathological effects has yet to be found.

Patient and Doctor. By SIR HENRY BRACKENBURY, M.D., LL.D. London: Hodder and Stoughton, 1935. Pp. 280. Price 5s.

FEW men can speak from such a thoroughly sound and sane point of view on the needs of the patient, the position of the doctor, his relation to the individual patient and to the community or the state, as Sir Henry Brackenbury. For he has been a general practitioner, a patient, and the spokesman of his colleagues, especially in regard to the National Insurance provisions for the care of the sick poor. After a sketch of the development of medicine from the primitive stage of magic to its present scientific character, Sir Henry deals with the relation between patients and doctor, and with a light touch refers to the old cartoon by Golzius, illustrating the lines of the poet-physician Heinrich Golde, about the angelic and godlike aspect of the physician when the patient is really ill and his devilish appearance when a fee is suggested for a cure. While mentioning that after a long illness the patient is sometimes more grateful to the nurse than to the doctor, Sir Henry suggests that medical students might with advantage share part of the nurse's training; he remarks that "without wishing anyone any harm" every doctor should early in his career go through a serious illness, thus agreeing with the late Stephen Paget's conviction that it is impossible to be a perfect doctor without having been a patient. The relation between the community, as patient, and the organized medical profession, as the doctor, is then set out and is followed by consideration of the general practitioner and public health. This clear exposition of what may be described in a good sense as medical politics can be read by the laymen and with almost equal benefit by their medical attendants.

Everyman in Health and in Sickness. Edited by Dr. HARRY ROBERTS. London: J. M. Dent and Sons, Ltd. 1935. Pp. xxvii and 739, 32 pages of photographs and numerous drawings. Price 12*s.* 6*d.*

A NOTICEABLE feature during this century has been the move to enlist and educate everyman in the search for health and freedom from disease. This has received the advocacy of the Ministry of Health and has been constantly and always convincingly and with charm set forth by Sir George Newman, who in addressing the Royal Sanitary Institute on the occasion of its Jubilee in 1926, drew a picture of Everyman as a future interpreter of preventive medicine. In spite of ancient proverbs to the effect that a man is either a fool or a physician after thirty or forty years of age, the earlier incidence being almost coeval with the christian era, having been ascribed to the Emperor Tiberius, instruction of the lay public was long discouraged by the medical profession. Now things are different, the big daily papers and some of the weeklies have their own medical correspondents. Dr. Harry Roberts with wide experience of Everyman and Everywoman, and of medical writing protests that he is not out to create "that crazy Utopia in which Everyman is his own doctor," but aims at the prevention of disease and in so doing covers a wide field. This well-illustrated volume contains sections on the diseases of children, the ailments of women and those of men in all the stages of life, on parentage and birth-control, the mind diseased, the art of nursing, and many other topics, some of which are perhaps a little over the heads of the ordinary lay reader, but in any event every lay reader will get an ample return for his money.

Diet Book of the David Lewis Northern Hospital, Liverpool. Liverpool: Lee and Nightingale, 1935. Pp. 44. Price 5*s.*

THIS conveniently interleaved account of the 44 detailed diets which for some years have been in use in the wards and Dietetic Clinic of the David Lewis Northern Hospital, is well arranged, has a useful index, and lists of foods containing respectively, practically no trace, 5 per cent. and 10 per cent. of carbohydrate. The diets are divided into four groups, for the treatment of gastro-intestinal disorders, renal disease and hypertension, diabetes mellitus, and a miscellaneous group; in this last group three ketogenic diets are put before the reader.

NOTES AND PREPARATIONS

MARGATE AS A HEALTH RESORT

THE British Health Resorts Association held a meeting at Margate on September 28 and 29, when, in addition to a banquet and a Corporation luncheon, discussions were held on "Town Planning at the Seaside," and "Convalescence on the Thanet Coast." Lieutenant-Col. R. H. Elliot, F.R.C.S., the founder of the association, said that the conference was an anniversary meeting as it was exactly four years ago that the letter appeared in *The Times* that gave birth to the association. Mr. Clough Williams-Ellis, F.R.I.B.A., who opened the discussion on "Town Planning," said that there was such competition between resorts to attract patrons by new and superior allurements, that those places that were most far-sighted, skilful, and well-advised won the prizes. No town could afford not to have an expert planner associated with it. In the course of the discussion emphasis was laid on the importance of the elimination of unnecessary noise in places which were visited by people who sought rest and quiet. Sir Leonard Hill, who opened the discussion on "Convalescence on the Thanet Coast," said that the south-east of England had most hours of sunshine and least rain, and was therefore most suitable for sanatoria. For convalescence the bracing qualities of the open air were most important. Dr. E. P. Poulton said that to the lay mind health resorts were always of two kinds—bracing and relaxing, and the term "bracing" apparently represented everything that was good and "relaxing" everything that was evil. A relaxing climate might, however, be of value in certain conditions, and he thought the term "sedative" should be used instead of relaxing. Mr. W. Greenwood Sutcliffe pointed out that Margate had been a pioneer in the treatment of surgical tuberculosis, and the Royal Sea-Bathing Hospital has specialized in its treatment for the past 136 years.

PAPWORTH VILLAGE SETTLEMENT

The report of the activities at Papworth for 1934 is now available in an attractively illustrated booklet entitled "Papworth, 1935." Sir Pendrill Varrier-Jones, the medical director, contributes a valuable survey of the general principles employed for the past 21 years since the idea of a tuberculosis settlement first came into a practical shape. An appeal to the public has recently been issued principally for new buildings of which the hospital for thoracic surgery is probably the most important.

THE PHOSPHATASE TEST

Attention has recently been directed to the phosphatase test for the detection of raw or insufficiently heated milk in pasteurized milk, originated by H. D. Kay and W. R. Graham, Junr. (*Journal of Dairy Research*, 1935, Vol. vi, No. 2). This test depends on the detection of the enzyme, phosphatase, which is always present in raw milk, but is destroyed at the temperature necessary for efficient pasteurization. The test can be conveniently carried out with the help of the B.D.H. Lovibond Limitester, and the British Drug Houses, Ltd. (Graham Street, City Road, London, N.1), have published a booklet on the subject which they will send on request to any medical practitioner.

NEW CLINICAL THERMOMETER

The Industrial Thermometer Company (83–84, Great Saffron Hill, Clerkenwell, E.C.), are introducing in this country clinical thermometers made from the patent red reading mercury glass of the Palmer Company, of Cincinnati, Ohio. This glass shows the mercury column in red or blue, and makes the reading of the thermometer much more legible.

" ELASTOPLAST TECHNIQUE "

The third edition of " Elastoplast Technique," which has just been published, has been greatly enlarged and improved, and now consists of a booklet of 75 pages, in which are described the various uses of and indications for elastoplast elastic adhesive bandages and dressings. The booklet is well illustrated and should be found useful as well as interesting by every practitioner.

THE CATECHISM SERIES

The Catechism Series, published by Messrs. E. and S. Livingstone, Edinburgh, has been famous for several generations of medical students, and now consists of over sixty separate parts and also a score of bound volumes of certain subjects. They do not profess to be textbooks, but are useful as an aid to the memory to retain the facts given to students in their lecture room and laboratories.

NEW PREPARATIONS

Bellergal.—This is a compound of ergotamine, bellafoline and phenobarbital, issued by Messrs. Sandoz Products, 134, Wigmore Street, London, W.1. It is intended chiefly for the treatment of disorders of the autonomic nervous system, and the manufacturers have issued a pamphlet, *Modern Therapy No.* 3, dealing with this subject. Migraine, Menière's disease, vertigo, tinnitus, autonomic instability, pruritus and eczema are some of the conditions apparently benefited by the administration of bellergal.

Kaldrox.—This is an adsorbent and antacid fluid preparation made by the Petrolagar Laboratories, Ltd. (Braydon Road, London, N.16), by activating colloidal kaolin with aluminium hydroxide gel. This activation apparently provides not only much greater adsorptive action, but mechanically soothes the mucous membrane and protects it against gastro-intestinal irritants. The preparation is indicated particularly in peptic ulcer, gastric hyperacidity, intestinal putrefaction and flatulency, colitis and diarrhœa, especially from food poisoning.

Petrolagar with Cascara.—This palatable new addition to the range of petrolagar preparations (made by the Petrolagar Laboratories, Ltd., Braydon Road, London, N.16), should be found useful by practitioners in many cases of obstinate constipation, particularly in pregnancy. The proportions are liquid paraffin 62 per cent. (by weight), agar jell. præparat. 20 per cent., cascara sagrada 14·7 per cent., with smaller amounts of gum acacia, glycerine, etc. The preparation can be diluted with water, milk or fruit juice if desired.

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DISEASES OF THE THYROID

By SIR HUMPHRY ROLLESTON, Bart., G.C.V.O., K.C.B.

Acting President of the British Medical Association.

FROM its superficial position the thyroid was the first ductless or endocrine gland to be recognized as the site of disease, and the obvious enlargement of goitre was described by Celsus, Pliny the elder, and Juvenal in the first century of the Christian era, and had been noticed even earlier, though it was then and, indeed, later confused with tuberculous adenitis in the neck, the two conditions being included under the term struma. Paracelsus, in the sixteenth century, clearly recognized the endemic character of goitre and its relation to cretinism in the Duchy of Salzburg. Paintings of old masters, for example, Albrecht Dürer's Madonna with the Pink, in the sixteenth century, bear witness to artistic accuracy by the presence of a goitre. It may be interesting to mention the meaning of the term bronchocele, used by Paul of Ægina in the seventh century and up to the second half of the last century as another synonym for goitre; it represented the view that the swelling (κήλη) was due to a hernial protrusion containing air from the trachea. In rare instances such æroceles were subsequently shown to occur. During its long history numerous factors have been incriminated for goitre. In 1867, Saint Lager, who had a goitre, collected 42 suggested causes, some of which overlap and others are extremely fanciful; all of which, except a water-borne factor, he critically eliminated. Formerly it was ascribed to some positive agent, such as excess of mineral salts; but now a negative explanation, namely, that it is the reaction of the thyroid to deficiency of iodine, has been widely accepted. McCarrison has brought forward much evidence in favour of a multiplicity of factors including bacterial infection, a faulty diet and vitamin deficiency, and iodine starvation. In 1917 the prevention of goitre by small doses of iodine was proved on a large scale in North America by Marine and Kimball, who gave short courses of two or three weeks twice a year, 2 grammes of sodium iodide being the total amount in each course. The use of small doses of iodine for the cure of existing goitre was revived in 1923 by H. S. Plummer, small doses being given to young subjects who appear to be much more prone to improve than older patients. Much discussion has taken place on the subject of the transformation, by the administration of iodine, of simple into toxic goitre, which T. Kocher, in 1910, had described under the name of Jod-basedow.

Exophthalmic goitre.—It may seem strange now that, although ordinary goitre was so long known, the striking features of exophthalmic goitre were not recognized until the nineteenth century; but it may have been just because goitrous enlargement of the thyroid was so familiar that the symptoms of hyperthyroidism were regarded as complications of goitre. Exophthalmic goitre has probably received more synonyms and eponyms than any other disease, among which the most recent and probably the best is toxic goitre, which includes " primary exophthalmic goitre " with exophthalmos and the " secondary " form of toxic adenoma occurring later in life in the carriers of an ordinary goitre. The inclusive term expresses the view, specially advocated by Dunhill and Fraser (*vide* p. 729), that the two conditions, regarded by H. S. Plummer, of the Mayo Clinic, as distinct, are phases of an essentially identical morbid process. The nature or pathogeny of the disease has received various explanations; it has been regarded as primarily cardiac, nervous, a cardiac neurosis, thyroidal disorder, either excess of the normal secretion (hyperthyroidism) or the production of an abnormal secretion (dysthyroidism).

Recently the responsibility has been shifted further back and the obvious changes in the thyroid tentatively considered to be secondary to disturbance of another endocrine gland, such as excess of the thyrotropic hormone of the anterior lobe of the pituitary or possibly failure of the adrenal cortex to control the activity of the thyroid. These hypotheses should have a practical bearing on treatment; at present the most successful results are obtained by cutting the chain of morbid transmission by thyroidectomy—a subject on which Mr. Geoffrey Keynes writes (p. 743). But discovery of the primary cause and of a means to prevent it is still urgently needed. The benefit resulting from thyroidectomy in cases with thyrotoxic heart failure has been followed by the employment of thyroidectomy in cases of congestive heart failure and angina pectoris without any evidence of hyperthyroidism. The benefit thus obtained has been ascribed to a fall in the metabolic rate and a diminution in the heart's work.

The treatment of toxic goitre by iodine has a somewhat interesting history. From the twelfth century seaweed and burnt sponge were employed empirically to cure ordinary goitre, and soon after iodine was isolated early in the last century it was similarly used, but with such enthusiasm that its toxic effects led to its unpopularity and eventual disuse. It was, however, employed in exophthalmic goitre by von Basedow and others, though not widely, and in the last quarter of the last century went entirely out of fashion; indeed, at a discussion on the treatment of exophthalmic goitre in 1921 at the Royal Society of Medicine it was not mentioned. Shortly after this, however, its use was revived, largely as the result of the advocacy of H. S. Plummer and E. Mellanby, and has been found to be mainly useful as a means of so improving the patient's state so as to enable thyroidectomy to be performed with the minimum risk.

Cretinism, on which Dr. Cockayne writes, was first described as an endemic disease and the sporadic form was not recognized until after the middle of the nineteenth century, namely, by Hilton Fagge in 1871. The differences described between the two forms have given rise to some discussion and a final decision still remains open. Cretinism from the striking nature of its endemic incidence is an outstanding example of the diseases which were first and for a long time recognized in early life before, as Hilton Fagge prophesied, the occurrence of "a cretinoid condition supervening in adult life in women" was described by Sir William Gull, his senior at Guy's Hospital, in 1873.

Myxœdema, on which Professor De Wesselow, a linear successor of Ord at St. Thomas's Hospital, appropriately writes, resembles sporadic cretinism in its irregular and non-endemic incidence and in, what may be a related event, its long escape from clinical detection. In 1891 G. R. Murray initiated the substitutional treatment by hypodermic injections of an emulsion of the thyroid gland, and in the next year Hector Mackenzie, E. L. Fox, and F. Howitz, Professor of Clinical Surgery at Copenhagen, independently published cases showing improvement after the oral administration of the gland. This successful remedy was the logical outcome of physiological experiments carried out by Schiff, Horsley and others, and, it should be added, of Felix Semon's deduction in 1883 that post-operative myxœdema (cachexia strumipriva), myxœdema, and cretinism are all due to the same cause, namely, the loss of thyroid function. This form of treatment, like that of diabetes mellitus by insulin, is, strictly speaking, not a cure, for it does not restore the normal functional activity for more than a short time. There are many conditions of benign non-myxœdematous hypothyroidism in which benefit is brought about by thyroid medication.

THE MEDICAL TREATMENT OF TOXIC GOITRE

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THE condition of hyperthyroidism or toxic goitre is typically one of relapses and remissions. The onset is usually a gradual one, the symptoms increasing in severity over a period of weeks or months, before improvement and remission set in. The stage of remission may continue to complete recovery, but such a course is unusual and more commonly a partial remission is soon followed by a relapse of varying severity, and the disease runs a chronic course of many years' duration marked by repeated relapses and remissions at varying intervals of time. A relapse may be sufficiently severe to cause death, and if the disease continues for many years, even if at no time very severe, auricular fibrillation is liable to occur and to result in congestive heart failure.

CLASSIFICATION AND NOMENCLATURE

The disease may occur at any age and the accompanying enlargement of the thyroid gland may be slight or great. The enlargement may be a diffuse one or the gland may be irregular with extensive fibrosis and the formation of nodules. In the younger patients the enlargement is more often diffuse and the symptoms of hyperthyroidism or toxicity more severe than in older patients in whom the gland is more often nodular and the symptoms of toxicity less severe. In the older patients, however, evidence of failure of the cardiovascular and other systems is frequently found even when the symptoms of toxicity are slight. It is not possible to maintain the distinctions that were at one time attempted between the cases of true exophthalmic goitre or Graves's disease with a diffusely enlarged gland and those of so-called " toxic adenoma." Every gradation in severity of symptoms and in irregularity of the enlargement of the thyroid gland is met with, and whether the goitre is diffuse or nodular the toxicity or hyperthyroidism is due to hyperactivity of the gland associated with hyperplasia, and the treatment is the same. The presence of fibrosis and nodules is evidence of the reactions that the gland has undergone in the past, and affects the conditions of toxicity or hyperthyroidism only in so far as it affects the capacity of the gland to undergo hyperplasia and hyperfunction. It is still undecided whether the thyroxine in the secretion of the thyroid gland is present in an abnormal chemical combination or in its normal combination but simply excessive in amount, and so the term " toxic goitre " is a convenient one to include all cases whether mild or severe and whether associated with a diffusely enlarged thyroid gland or a nodular gland.

FACTORS IN CAUSATION

The cause of the condition is unknown but the onset or beginning of a relapse is so frequently associated with one or more of a number of conditions that these must be regarded as accessory factors. Acute infections, especially tonsillitis and influenza, and acute mental traumas, financial or social, are frequently stated to cause the condition, but chronic focal infections and long-continued worries and troubles, often of a domestic nature and not infrequently sexual or marital, are important factors in the more chronic and relapsing cases. It is important to recognize the presence of such accessory factors for the efficiency of treatment and the prognosis will depend to a considerable extent on the possibility of their removal or alleviation. Such events and stresses occur in the lives of many persons without causing hyperthyroidism and cannot be regarded as the essential factors in the etiology. It is not rare for two or more cases to occur in one family or to find the disease in a mother and daughter, and it is difficult to avoid the belief that there is a constitutional basis for the disease. In many of the patients a state of inefficiency or ill-health has been present for many years previous to the onset, and it is of the utmost importance in assessing the prognosis to consider carefully the efficiency of the patient previous to the onset of the hyperthyroidism. Failure to do this will often result in disappointment with the results of treatment.

PRINCIPLES OF MEDICAL TREATMENT

Since the cause is unknown, treatment cannot be directed to the cause. The condition is associated with hyperplasia and excessive activity of the thyroid gland and the operation of subtotal thyroidectomy, by reducing the amount of functioning gland tissue, is generally accepted as an effective method of treatment. The operation, however, is always a serious one, and, except in the hands of surgeons with extensive experience of operations on the thyroid gland, may be dangerous to life. It should not therefore be undertaken if recovery can be obtained by other means, nor should it be undertaken except at a time when the patient is in the best condition to stand it and when the risks are reduced to the greatest extent possible. The safest time for undertaking surgical treatment is in the stage of remission. Whether surgical treatment is undertaken or recovery can be attained without, the object of medical treatment is therefore to cut short the stage of relapse or of increasing severity and initiate the stage of remission.

Rest.—The most important method of medical treatment is rest, rest for the mind as well as for the body. Except in the mildest cases complete rest in bed is advisable for a week or more at the beginning of treatment. In some patients, such as those with persistent high grades of tachycardia or with auricular fibrillation and congestive heart failure, complete rest in bed may be required for many weeks or months, but in milder cases prolonged confinement to bed causes annoyance and restlessness, and improvement results on allowing the patients to be up for a part of the day and permitting a certain amount of gentle physical activity. Careful inquiry must be made into possible sources of mental irritation, domestic and marital troubles, before deciding whether treatment can be carried out efficiently in the patient's home. The disease causes nervousness and irritability and after a time misunderstanding and frayed tempers produce situations that are the result of the disease rather than causative factors, but such situations are not conducive to satisfactory treatment. It is usually advisable for the treatment to be carried out for a time at least in a hospital or nursing home. Inquiry must also be made into financial or other forms of business worries, before deciding upon the visitors to be permitted, and the amount of correspondence that is to be allowed. Whereever the treatment is being carried out the surroundings should be bright and cheerful and the nurses and attendants congenial to the patient.

During the first few days a careful search is made for foci of infection, and attention is paid to obtaining restful sleep. As the patient becomes used to the new surroundings and the new routine the severity of the symptoms abates, often to a considerable extent; the pulse rate falls and the nervousness and restlessness diminish. As a rule a state of comparative stability is reached at the end of a week or ten days and it is then possible to form a clear estimate of the severity of the condition. If the patient is not already taking iodine, its administration should then be begun.

Iodine.—There has been much misunderstanding of the part played by iodine in the treatment of toxic goitre. Iodine does not cut short the course of the disease. It produces a moderation in the severity of the symptoms, and if available in sufficient amounts enables the disease to run its course at a lower level of severity. The improvement will vary according to the state of the thyroid gland and the amount of available iodine it contains. The diffuse hyperplastic gland containing little iodine will react markedly to the administration of iodine and the patient's symptoms will be affected in a striking manner, but when the gland already contains a considerable amount of iodine and the degree or the extent of the hyperplasia is less, the symptomatic response will be less. The diffusely enlarged and vascular thyroid gland that usually accompanies the severe case of the classical condition of exophthalmic goitre in a young woman contains little iodine and is in a state of pronounced hyperplasia, and in such the iodine response is striking. The nodular gland with fibrosis and irregular patches of hyperplasia side by side with areas in which the acini contain colloid is a frequent accompaniment of the milder grades of toxicity seen in older patients and contains a considerable amount of iodine, and in such only slight clinical improvement can be obtained by the administration of iodine. When iodine has been given and the administration then stopped, the iodine that was stored in the gland is retained for a length of time that seems to be inversely proportional to the severity of the toxicity or hyperfunction, and it is usual, as might be expected, to find that the response to a second course of iodine is disappointing unless a long time has elapsed between the two courses. Hyperplasia of the gland is a constant accompaniment of hyperthyroidism or toxicity, and a response to iodine with amelioration of symptoms is a characteristic of the disease.

It is important to remember that iodine does not alter the course of the disease, so that if it is administered at the time of increasing toxicity, there will be a temporary diminution of the symptoms followed by an increase as the disease continues to follow its course, but the symptoms will even then be less than they would have been if iodine was not being administered. If, however, the iodine is begun during the stage of remission, following the immediate improvement due to the iodine the symptoms will continue to abate and will be less in severity than if iodine had not been given. It is only when the gland is already fully "iodized" that no response is obtainable, but when the toxicity is severe, and rapidly and critically increasing in severity, the iodine response may be masked by the rapidity of the increase.

The iodine remission is fully developed in from eight to ten days. It is immaterial in what form the iodine is administered so long as it is in the form of inorganic iodine. Simple salts such as potassium iodide or solutions of the element iodine are the usual preparations, and an aqueous solution of potassium iodide and free iodine, such as Lugol's solution, is a convenient method of administration. If Lugol's solution (iodine two, potassium iodide three and water forty parts) is given in doses of five drops three times a day a full iodine response is obtained. It is given conveniently in a wine-glassful of milk. The liquor iodi simplex (B.P. 1932) is given in the same doses and in the same way and is a solution of iodine in alcohol without potassium iodide; and some patients appear to prefer it. Potassium iodide in doses of two grains a day contains approximately the same amount of iodine and is equally efficacious.

In many cases the iodine can be continued in these doses indefinitely. In some, however, the thyroid gland becomes so hard as to cause discomfort to the patient, and it is usually advisable to reduce the dose at the end of three or four weeks to 10 drops or even to 5 drops a day of Lugol's solution. If the gland has become uncomfortably hard the iodine should be stopped for a week and then begun again at a lower dose. Another reason for avoiding the production of the extremely hard gland is that surgeons find it awkward to manipulate in the operation of thyroidectomy.

Diet.—In the majority of instances patients with toxic goitre have good appetites and there is no difficulty in inducing them to take a well-balanced diet in generous amount. There is no clear indication for any special articles of diet, but the metabolism is raised and the energy requirements above the normal so that the diet should be generous. Care should be taken to see that the necessary vitamins are supplied and that sufficient carbohydrate is taken, for there is some evidence that the organs may become depleted of their glycogen stores. It is important to weigh the patient at weekly intervals, for a steady gain in weight is a most valuable indication of improvement and of the establishment of a remission. In some patients the appetite is poor and if this continues after treatment with iodine it must be regarded as an unfavourable sign, as it occurs in patients already exhausted by the disease, who are among the most difficult to treat successfully, and who even after the operation of thyroidectomy fail to regain health satisfactorily. In such patients every art must be utilized to induce them to take a sufficient diet or their condition steadily deteriorates.

Focal infections.—Chronic infection may be found in the tonsils, teeth or nasal sinuses and in the milder cases should be dealt with as soon as possible. In the more severe cases it is advisable to wait till an improvement in the general condition has been obtained by rest and iodine. In the very severe cases and especially if mental or cardio-vascular complications are present, the procedures necessary for dealing with such focal infections may be best postponed till after a partial recovery has been obtained by means of surgical treatment of the thyroid gland. The operation of tonsillectomy is often as great a strain on these patients as thyroidectomy and greater than that of ligature of thyroid arteries, and should not be undertaken without careful consideration of the risks. When the toxicity is severe it is not uncommon to find large, red tonsils without signs of localized infection, and such tonsils diminish in size and approach a normal state as the general condition of the patient improves, and may become normal when recovery is obtained.

Sedatives and hypnotics.—When the patient has settled down in congenial surroundings there is usually little difficulty in obtaining satisfactory sleep at night, especially if a good response to iodine is obtained. During the day time, however, the nervousness and restlessness may require to be controlled except in the mildest cases. The bromides are not as a rule efficacious, but luminal in doses of half a grain two or three times a day is useful. In the more severe cases this may require to be increased to twice that amount, and in the very severe it may be necessary to use hypodermic injections. For this purpose sodium luminal in doses of one-and-a-half grains or sodium amytal in doses of 0·2 gramme should be given sufficiently often to produce the desired effect. During the first twenty-four or forty-eight hours after admission to hospital or to a nursing home it may be advisable to use morphine. If the patient is unable to obtain sleep at night, the usual hypnotics, such as chloral or medinal, should be given in the evening.

INDICATIONS FOR THYROIDECTOMY AND IRRADIATION

When treatment by rest, iodine and sedatives is carried out on these lines the condition will, as a rule, cease to progress in severity and improvement will be seen. In a few cases this improvement continues steadily and complete recovery occurs in the course of several months. More commonly the recovery is only partial. If at the end of six months the condition is not so favourable that an early return to health can be expected the disease is likely to follow a chronic course with relapses. To restore health and efficiency and to avoid the cardio-vascular complications that occur when the condition persists for any length of time, it is necessary to reduce the amount of functioning thyroid gland tissue. This is most effectively accomplished by means of thyroidectomy, but can also be brought about by irradiation of the gland by means of X-rays or radium. At present X-rays are preferable to radium, perhaps because the experience in the use of X-rays for this purpose has been greater. Treatment by irradiation, however, takes months to accomplish what surgical operation can do in a few weeks, and is much less reliable, frequently failing entirely. It is, of course, less dangerous to life, but the operation of thyroidectomy by surgeons skilled and experienced in the surgery of the thyroid gland is now almost free from danger. If, therefore, the requisite surgical help is available operation is the best method of treatment.

When the thyroid gland is fibrotic and nodular complete recovery is less likely to result from medical measures alone and there is less reason to delay recourse to surgery. Once mental or cardio-vascular complications have appeared it is advisable to operate at the first favourable opportunity. On the whole the longer the disease has already lasted and the older the patient the sooner should the operation of thyroidectomy be performed.

If possible operative treatment should be undertaken in the stage of remission. Unfortunately the operation cannot always be postponed until a remission is well established and the operative risks reduced to the greatest extent possible. Too often the expenses of the nursing home or other questions of expediency force the hand of the surgeon to operate at a time other than the most favourable, and thus to increase the danger of the operation.

In a few cases it is not possible to delay operation till a remission occurs, without risking the patient's life, the severity of the symptoms increasing rapidly in spite of all the measures adopted. It is in such patients that the operation is especially dangerous, and in them it may be advisable for the surgeon to proceed in two or three stages, and to commence by ligating one or more of the thyroid arteries. If iodine has not already been given the opportunity should be taken to operate at the time of the maximum iodine response.

CARDIO-VASCULAR AND OTHER COMPLICATIONS

The rapid action of the heart is the result of the toxicity and subsides as the general condition improves. It is not an indication for giving digitalis or any other special remedy. When, however, the disease has continued for many years, even if at no time very severe, or if the patient is past middle life and at an age when degenerative changes are to be expected, the onset of auricular fibrillation is commonly observed. It occasionally arises in young subjects after a short illness if the toxicity is very severe. When this complication first appears it may do so in occasional paroxysms, but sooner or later it becomes established. Temporary auricular fibrillation occurs not infrequently in the first few hours after the operation of thyroidectomy, but disappears as the patient recovers from the operation and rarely requires any special treatment. Established auricular fibrillation, however, leads to congestive heart failure unless the ventricular rate can be controlled, and digitalis must be given just as in auricular fibrillation due to other causes. It is often more difficult to control the ventricular rate in thyrotoxic auricular fibrillation than in this condition due to other causes and care must be exercised not to push the digitalis administration to the production of digitalis intoxication. In cases with œdema and ascites digitalis may not suffice and salyrgan is then usually effective.

The auricular fibrillation of toxic goitre can be stopped and normal rhythm restored by quinidine, but the more severe the hyperthyroidism the more difficult this is to accomplish and the earlier the relapse to auricular fibrillation. It is therefore rarely advisable to attempt to restore normal rhythm by means of quinidine until after the toxic goitre has been treated. As treatment by irradiation requires several months at least to be effective and as the presence of auricular fibrillation is a constant menace of congestive heart failure, this irregularity should be regarded as an indication for surgical treatment at the first favourable opportunity.

Following subtotal thyroidectomy a spontaneous return to normal rhythm will occur in many instances even after a lapse of several weeks, but there is nothing to be gained by waiting, and it is better to give quinidine if a spontaneous return to normal rhythm does not occur in one or two weeks after thyroidectomy. A successful method is to give a single dose of five grains of quinidine sulphate and, if no untoward symptoms occur, to give two doses the next day, in the morning and at midday, and three doses the following day. Three doses of five grains should then be given for three or four days and in most cases reversion to normal rhythm will occur. If the irregularity persists, four doses should then be given for several days. If no response is obtained with this dosage, in a few only is a successful result obtained by larger doses, but they should be tried by giving three doses of ten grains in the day. If no response is obtained then it is advisable to abandon the attempt for the time, to control the ventricular rate with digitalis and to try quinidine again a few months later.

After the rhythm has become normal it is advisable to continue quinidine for several weeks. Two doses a day of five grains each is a suitable maintenance dose, and although frequently unnecessary it is convenient to continue this for a month. It can then be reduced to one dose of five grains for a further month. If auricular fibrillation should return, quinidine should again be given as before, and if even occasional paroxysms occur it is advisable to continue a maintenance dosage indefinitely. Frequent auricular extrasystoles occur in a few patients after reversion to normal rhythm, causing discomfort, and can be controlled similarly by a small maintenance dose of quinidine.

Mental complications.—Serious mental disturbances usually of the maniacal type rarely occur and cause anxiety. As a rule such complications are an indication to proceed to surgical treatment. These mental disturbances may appear for the first time immediately after operation or be aggravated by it, but usually subside and completely disappear, as recovery from the thyrotoxic state results. A careful study of the mental condition of the patient previous to the onset of the toxic goitre and of the mental history of the family must be made before deciding on surgical treatment.

Pregnancy.—If a patient with toxic goitre becomes pregnant it is advisable to allow the pregnancy to continue to term, for the symptoms rarely are aggravated during the pregnancy and may even moderate. During the puerperium, however, an aggravation of the toxicity may occur, and an artificial termination is usually followed by a serious relapse. If it is considered that the strain of pregnancy is likely to be dangerous, as in the more severe cases with cardiovascular or mental disturbances, thyroidectomy should be performed and the pregnancy continued.

TOXIC GOITRE IN CHILDHOOD

The principles of the treatment of toxic goitre in childhood are the same as in adult life. In childhood the strain on the organs is less likely to be dangerous and recovery is more probable so that treatment by rest, iodine and general management can be continued for longer before deciding that surgery or irradiation must be used. Further, as the child approaches adolescence and reaches adult life considerable readjustment takes place in the glands of internal secretion so that the consequences of removing or destroying a part of the thyroid gland are difficult to foresee. On the other hand a prolonged illness with such profound effects must be a serious handicap at the time of growth and of mental and physical development, and may be of serious economic importance at the time of education. These various considerations must be carefully weighed, but the most important consideration is to save life, and if medical treatment does not bring about a satisfactory remission there is always the danger of a serious relapse, and timely surgical treatment may be life saving.

PROGRESS AND AFTER-TREATMENT

Even if surgical treatment is employed it must be regarded as but an important incident in the management of the patient, and if recovery is being attained by other and slower means, such as medical measures or irradiation, the patient must be guided and aided for many months or years. The frequency of the heart beat gradually returns to normal but readily rises with emotional upsets or physical exertion. During the months when readjustments and recoveries are taking place, the patient should rest for an hour or two during the afternoon, should go to bed early, should avoid excessive physical exertion and emotional excitement. The return to normal life must be a gradual one, especial care being taken if any accidental infections should occur. The administration of iodine should be continued during this period of return to normal health, as it appears to aid the thyroid gland in the process of readjustment, and a dose of five drops a day of Lugol's solution for six months or a year after the operation of subtotal thyroidectomy is sometimes recognized by the patients themselves to be helpful. Some, on the other hand, state that they are unable to discern any difference whether they take it or not. A few fail to gain weight satisfactorily unless they take it, but others gain weight excessively during the period of recovery and slowly return again to their normal state. Iodine has appeared to aid this return to a normal balance.

It is usual to find that the menstrual periods cease or become irregular with scanty loss when the disease is active, and that they return to their normal cycle with recovery, or a few months after successful surgical treatment.

CONCLUSION

There are few diseases in which it is more important to study every detail of the patient's life, the home, the relatives, the financial position, the business worries, the health and efficiency before the onset of the disease, and the mental state and physical health of the immediate forebears; and only by such study can the probable results of treatment and the subsequent efficiency of the patient be estimated. If surgical treatment is employed care must be exercised in the choice of a surgeon experienced in this type of operation, and in deciding when to operate. A surgical operation is an incident in the management of the patient, and whether or not surgery is employed the patient must be guided and aided for many months or years. Only by such study and such care can recovery be attained and efficiency restored.

THE SURGICAL TREATMENT OF TOXIC GOITRE

By GEOFFREY KEYNES, M.D., F.R.C.S.

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THE surgical treatment of toxic goitre is not in its first flush of initial successes, but has been widely practised for fifteen years. It has been subjected to searching criticism, and has been tested in the furnace of the follow-up system. Results have not been assessed merely by " impressions," but have been closely observed over a period of years by both physicians and surgeons, and there can be few operations in the whole range of surgery that have given more satisfaction to both branches of the faculty. The problem has not been a simple one. The shadow cast by the original describers of a supposed clinical entity called " exophthalmic goitre " has lingered long enough to prevent even now a universal understanding of the fundamental relation between all degrees of thyroid intoxication, from the full-blown " exophthalmic goitre " described by Graves and von Basedow to the obscure case of tachycardia without any appreciable enlargement of the thyroid gland or any other unequivocal signs of the disease. Much confusion and uncertainty have persisted, though an effort has been made to widen the basis of knowledge by introducing the term *toxic goitre* to cover all the possible clinical variations in place of the limiting names, Graves's disease, Basedow's disease, exophthalmic goitre, and so on. Even the term toxic goitre is not entirely satisfactory, since, as already mentioned, some of the patients do not have any clinical " goitre," but it has certainly assisted in establishing a correct surgical approach to a problem which does not seem quite so complex now as it did a few years ago. It is not the purpose of this contribution to discuss questions of pathology or etiology, but rather to indicate the part played by surgery in the treatment of toxic goitre, though it is necessary at the outset to disclaim the view that the thyroid surgeon is merely a carpenter at the beck and call of the physician. Collaboration between physician and surgeon is one of the first requisites for successful thyroid surgery, but at the same time the surgeon must think of every patient as a pathological and clinical entity, who must be considered individually in relation to the treatment he proposes to apply. The manifestations of the disease are far too various for any mechanical rule of thumb to be used, and on the surgeon's knowledge and judgment depends the avoidance of "too much" or "too little" in such different states as the acute primary toxic goitre, the later stages of the long established disease, the chronic secondary toxic goitre the manifestations of which may be mainly cardiac, and lymphadenoid goitre with mild toxic symptoms—to mention only a few of the more striking clinical varieties. The surgeon must also have a hand in the preparation of the patient for operation, and must be able to decide for himself (sometimes even in the face of medical opinion) when the correct time for operation has arrived, or whether it shall be done at all. Finally, he must have a good idea of what the effects of his operation will be, both immediate and remote, so that he may direct not only the post-operative course, but also advise the patient on the future conduct of his or her life.

THE CHOICE OF PATIENT

In speaking of the choice of patient from the surgical point of view it must be assumed that there has already been eliminated the probably large class of patients suffering from minor degrees of thyroid intoxication who will never come under surgical consideration at all. All hyperthyroid patients have been through the medical sieve before they reach the surgeon, and the residuum will include all those who are incapacitated by their disease or show signs of serious cardiac injury from a degree of intoxication which is not in itself incapacitating. The latter category will consist largely of the old-standing nodular goitres which have become secondarily toxic and have insidiously produced changes in the heart, culminating not infrequently in auricular fibrillation. If the patients are incapacitated for work or for a normal existence, but have undamaged hearts, many of them will have been subjected to a trial of treatment by rest, insulation from responsibility and worry, and sedative drugs, such as luminal. Unfortunately many will also have been given iodine medication, though there is a growing recognition of the fact that iodine should be used very cautiously and chiefly as pre-operative treatment. If it is thought that operation cannot be avoided, then iodine should not be used at all until preparation for the operation has actually been begun. Patients are naturally reluctant to believe that operation is really necessary unless the failure of medical treatment over a considerable period has been demonstrated to them, so that the surgeon will be well advised to refuse to act unless both patient and doctor are convinced of the necessity for his help. He should, however, advocate prompt action where economic conditions make any prolonged form of treatment impossible, or where experience has shown him that conservative treatment will be useless. This will apply, as already indicated, to toxic nodular goitres and to all patients with signs of injury to the heart. "Prompt action," however, will seldom mean immediate operation. For every patient there is an optimum moment for operation, that is, the moment of minimum risk, and both medical and surgical experience are needed for judging when this has arrived. It is during this pre-operative period that iodine will play its part, its maximum effect being usually obtained within two to three weeks. Nearly all patients will respond excellently to iodine, luminal, and strict confinement to bed, the chief evidence of progress being seen on their pulse charts and in their general demeanour. Estimation of the basal metabolic rate may provide useful confirmation, but clinical experience will usually be the better guide. The patient's weight is also a useful indication, an increase being almost always a favourable sign. An appreciable loss in weight is not necessarily, however, a contra-indication to operation, as some patients continue to lose weight although in other respects they are improving. The scale will, in fact, not be turned until after the operation has been done, when a rapid increase in weight is to be expected. The cardiac state of the patient may be a very important consideration in deciding when to operate. In the majority of patients with toxic goitre the heart is overacting and it may be slightly enlarged, but it will not give rise to anxiety unless there is some serious defect in operative technique, resulting in undue loss of blood or surgical shock. When, however, there are signs of heart failure, particular attention must be paid to improving them. Complete rest is by far the most important measure to be used, and this must be prolonged until obvious remission of the signs of failing heart has been obtained. Drugs do not as a rule play an important part in the treatment, the value of digitalis and its derivatives not being very great, except in the presence of auricular fibrillation. It may here be emphasized that fibrillation should not be regarded as a contra-indication to operation, but rather the reverse. A fibrillating heart may be temporarily improved by medical treatment, but it is not often that the fibrillation can be abolished. The operative risk, on the other hand, is not greatly increased by the presence of fibrillation, and the operation is the only really effective means that can be used to achieve a permanent restoration of the normal rhythm. Some patients with toxic goitre have an extreme irritability of the heart, the pulse rate rising to fantastic heights in response to any disturbance. Usually this cannot be effectively controlled by medical treatment, but is rather an indication for cautious surgery and operating by stages. Lastly there is the question of the patient's mental condition, and here it may be stated that mental derangement is almost the most serious of the danger signs. Operation, in fact, should not be undertaken except as an admittedly desperate measure, the situation demanding the assumption of serious risks in an attempt to save a patient who is otherwise certainly doomed. Mention must be made of the possible uses of other surgical procedures in preparing the patient for partial thyroidectomy. Attention to teeth, including extractions, can usually be tolerated and should generally be carried out. Tonsillectomy is a more serious affair, and should only be done if it is quite certain that the operation entails no risk to the patient's life. If the patient is seriously ill, removal of the tonsils will not cure the disease, so that it may be left until it has been made safe by surgical treatment of the goitre.

THE OPERATION

The operation for toxic goitre has been regarded in the past as an exceedingly dangerous procedure, and no doubt during the earlier years of its popularity the operative mortality was high. The methods of making the patient safe for operation were not developed, and the proper use of iodine for this purpose was not understood. The importance of having the right form of anæsthetic was also not appreciated, and indeed the newer compounds for inducing unconsciousness, now found so useful, had not been invented. The need for a very precise technique and for constant practice in performing the operation was not fully realized. In all these respects great advances have been made in the last ten years, but even now it cannot be stated too strongly that thyroidectomy for toxic goitre is one of the most exacting operations in surgery, demanding the closest attention to detail at every stage. There is so much variation in individual circumstances and in the size, consistency, and vascularity of the thyroid gland that it is almost true to say that there are never two exactly alike. The operation can never therefore be reduced to a strict routine, and the slightest inattention is always rewarded by increased loss of blood, which has a particularly bad effect on toxic patients.

The question of the best anæsthetic has received much attention, and it is recognized that it is wise to avoid the use of ether or chloroform altogether. Some operators have preferred local analgesia only, after hypodermic injection of a narcotic drug. The best results appear to be obtained by giving a basal narcotic such as rectal avertin, followed by local infiltration of the neck with ½ per cent. novocaine and 1/500,000 adrenaline. Gas and oxygen is usually given as well for part or the whole of the operation. Paraldehyde or nembutal are also used for the basal narcosis. This method gives the patient the minimum of disturbance, avoids secondary toxic effects even though the operation is somewhat prolonged, and usually keeps her in a quiescent state for some little time after she has returned to bed. These various factors seem to have contributed in some degree to the present low mortality rate.

This is not the place to discuss the technical details of the operation, but attention should be drawn to the following points:—

(1) The operation should be drastic if the best results

are to be obtained. A hemi-thyroidectomy has an excellent immediate effect, but the patient will always suffer a relapse later. In all except the milder types of the disease at least nine-tenths of the gland should be removed and often more. This applies particularly to the primary toxic goitre, in which the gland is very active and able to regenerate. The secondary toxic goitre, usually nodular, is not so active in proportion to the bulk of the gland, so that rather more should be left behind.

(2) Those parts of the gland that are left should be taken from the posterior borders of each lobe in such a way that the recurrent laryngeal nerves and the lower parathyroid bodies are left undisturbed. The whole of the isthmus should be removed leaving the trachea exposed, otherwise an unsightly lump is likely to be visible afterwards in the middle of the neck.

(3) The operator must never approach the operation with the fixed idea of completing the operation at one sitting. He must always be guided by circumstances, and should design his procedure in such a way that, if the patient's pulse-rate is rising unduly, the operation can be stopped halfway. The interruption of a thyroidectomy when only one side has been done will sometimes save the life of a patient who would be lost by rigid adherence to a set plan, for the patient's reaction depends more on the degree of interference than on the amount of thyroid left behind, and nothing will ever be lost by proceeding in stages. Appreciation of this point will also relieve the surgeon of the feeling that he must proceed with extreme speed. If the right kind of anæsthesia is used, speed is not likely to be an important consideration. The attainment of great speed is

likely to be attended by an increased risk of secondary hæmorrhage, and increased disturbance to the patient. Gentleness and speed are not usually compatible, and to a thyroid patient gentleness is of much greater importance than the saving of a few minutes on the operating table.

(4) "Operation in stages" usually refers to the performance of a hemi-thyroidectomy in the first stage and removal of part of the other lobe in the second stage. There may, however, be the necessity for another first stage, the ligature of the superior thyroid arteries. This will not often be required, as it should be reserved for those patients who are so ill that even a hemi-thyroidectomy would be dangerous. Fortunately pre-operative medication has now almost eliminated the necessity for operating on patients who are as ill as this. Yet there is still a residuum of patients in whom preliminary ligature of the arteries will just turn the scale, and convert a highly dangerous operation into a reasonably safe one, though the thyroidectomy will even then still have to be done in two stages. The effect of the ligature, though always transient, is definite enough as a rule to be registered on the pulse chart, and thus enables the surgeon to seize the right moment for further interference. It is true that the seemingly trivial operation of ligature has its own mortality, but this is inevitable since it is reserved for the desperate state in which the patient will certainly die if nothing is done, and may die even if the minimum is done. It must not on this account be discarded as useless.

(5) Due attention should be given to the cosmetic results, since this need not affect the efficiency or safety of the operation, and, owing to modern

fashions, is usually of importance to the patients. The collar incision that is now almost universally adopted, with lateral drainage from the extremities of the wound, gives excellent cosmetic results. Frequently, indeed, within a few months of the operation it is virtually invisible. Knowledge of this will give most female patients a really disproportionate confidence in the general result of the procedure, and gaining the patient's confidence is always an important part of the treatment.

RESULTS

The results of any operation will have to be assessed under two heads: the operative mortality and the effect on the patients that survive. This is perhaps the most important part of the surgical contribution to the present symposium, and it will be considered first as to the effect on the patient, secondly as to the price that must be paid.

The extent to which the individual reacts to an operation depends first on how ill she was beforehand and secondly on operative technique. It must be assumed that medical preparation has been adequate, that the anæsthetic has been properly chosen, and that the surgical technique has aimed at the minimum disturbance and loss of blood. In the average case of moderate severity the pulse-rate will rise from say 100–110 to 130–140, and this may be maintained for 36 to 48 hours. The patient complains of pain on swallowing, slight tracheal irritation, and looks flushed and worried. There may be restlessness, which can usually be controlled by drugs. It is remarkable with what rapidity these initial symptoms usually pass off. After the first 48 hours the pulse-rate shows a steady decline, and often has reached a 70–90 level within ten days of the operation. The drainage rubbers are removed on the first day, the skin clips on the second day, and dressings may be discarded on the fourth day. The pain and discomfort in the neck soon become unimportant, and many patients have declared on the fifth day after operation that they "have not felt so well for years." This feeling of well-being is to be attributed chiefly to the relief of "palpitations" or "pounding" of the heart, and to the lessening of psychological strain. If the heart has been fibrillating before operation, the discrepancy will tend to decrease at once, and the fibrillation will often disappear finally about the fourteenth day. If it has been controlled by treatment before operation, it will usually reappear immediately after operation or even on the operating table, but will disappear once more within three or four days. Convalescence may usually be regarded as fully established by the tenth day, and the patient's stay in hospital or nursing home can usually be terminated after fourteen days. This rapid recovery often encourages the patient to regard herself as "cured" and to wish to return to normal life within a few weeks. She should, however, be warned against allowing herself to proceed too quickly. A standard of three months' quiet life and resting should be set, this period being necessary for the recuperation of the heart muscle, for the adjustment of the endocrine balance, and for the gain in weight of from one to two stones that usually takes place. It is not necessary in most cases to continue iodine medication for more than a fortnight after operation. At the end of this three months' period the patient is often scarcely recognizable. The eye signs will usually still be present in some degree, but tremors and sweating will be absent. The patient will be calm, and able to sleep well. She eats normally, but is very often afraid of getting "too fat." This fear is natural, the contrast between her previous emaciation and subsequent plumpness being so conspicuous. Usually, however, the increase in weight merely represents her normal tendency, once the hyperthyroidism has been removed, and it should not be too readily suggested that she is suffering from thyroid deficiency. Hypothyroidism is, in fact, very seldom seen, even after the drastic operation that is now usually performed. Occasionally a tendency in that direction may be recognized, but if so it can be controlled by a daily dose of one or two grains of a thyroid preparation, and even this can usually be discontinued after a few weeks or months, a readjustment of the gland to the minimum needs of the body being established after excessive removal.

If the patient pursues the favourable course described above she will be able to resume a quiet but almost normal life at the end of three months, and to take her proper place in life two or three months after that. The improvement seems to be in most instances permanent, though the writer has seen relapse even after ten years owing to a regeneration of thyroid tissue taking place in the remnant of gland left on one side of the neck. The word " cure " should in fact never be used in relation to toxic goitre. It is obvious that operation on the thyroid gland is treating a symptom rather than the disease, and is in fact merely breaking a link in the complex which is moving in a vicious circle. The result of operation is often so good that the patient looks upon herself as " cured," but even so the gland that is left behind is not normal, and very often some trace of the original symptoms can be found if they are sought for carefully enough. Moreover, it is true, as Sir Thomas Dunhill has often pointed out, that many of the patients were physically or mentally imperfect before the toxic goitre developed, and no treatment can be expected to make the patient better than she was before she was ill, particularly in respect of mental or functional imperfections. Furthermore the degree of recovery of which the patient is capable is determined partly by the age of the patient and the time for which the thyroid intoxication has been present, that is to say by the amount of damage that has already been done to the heart muscle and constitution. Full realization of these limitations will prevent many disappointments.

It is the presence of these complicating factors which prevent any precise estimate of results from being given statistically. It may be stated, however, that nearly all the patients are enabled to live an approximately normal instead of a semi-invalid life, and that the majority are able to assume full activity, both physical and mental. Toxic goitre is much commoner among women than among men, but it is noticeable that on the whole a larger proportion of affected males makes a complete recovery than among the women. It is, in fact, very unusual to meet with a male patient who has not been able to return to full activity after an adequate partial thyroidectomy for toxic goitre.

Allowing for many individual variations, the above account of the course after operation may be taken to represent the average. Against this may be set the minority of patients who have a stormy course instead of a smooth one, and need a longer period for recuperation than the average. Reference has already been made to the necessity for operating in two, three, or even four stages. This is done in order to avoid the dangerously violent reaction known as " thyroid crisis " which is liable to occur in those patients who are most seriously ill. Adequate medical preparation and operating in stages have now almost eliminated the thyroid crisis, but still it is occasionally seen quite unexpectedly and it may also follow almost any operation undertaken as a desperate measure to save a patient who is quite obviously on the down-grade without hope of spontaneous recovery. When the patient passes into a thyroid crisis the pulse-rate rises to 180, or even to more than 200, and tends to become of very poor volume. The patient is very restless and unable to sleep, and death may result from exhaustion of the heart muscle after 48 hours or less. Accompanying mental derangement is an almost invariably fatal symptom. Many patients, however, have been tided over a thyroid crisis and their ultimate recovery has been as complete as that of anyone else. Probably the most effective emergency measure to take in a thyroid crisis is to increase the oxygen concentration in the atmosphere breathed by the patient, and this can be most effectively done by an "oxygen tent." If this is unobtainable, oxygen may be given through a nasal tube, though it will not be as effective as the tent. All risk of a thyroid crisis is likely to be over when 48 hours has elapsed, though it may be precipitated even after that by any acute infection such as a bronchopneumonia. Fortunately pulmonary complications are uncommon if the anæsthetic is correctly administered.

Among the effects of operation must be mentioned vocal cord paralysis and parathyroid deficiency. Both these mishaps may be almost completely eliminated by correct technique, and they need not be seriously considered in weighing up the risks of operation performed by competent hands. If a vocal cord should be paralysed it will probably be only a temporary phase, and will tend to recover spontaneously. Parathyroid deficiency has been described in the literature and has been found very troublesome, though the tetany and other symptoms can be made to yield in the end to calcium medication and Collip's parathyroid extract. It is possible that occasional examples of profound depression following recovery from toxic goitre have been due to a minor degree of parathyroid deprivation.

The prospects, therefore, for the patient with toxic goitre treated by operation are comparatively favourable, and there can be no doubt that the result will be obtained more quickly and certainly by adequate surgery than by any form of medical treatment or by radiology. The cogency of the arguments for surgical treatment is therefore very strong provided that the patient's safety can be guaranteed. In the past it was urged with some show of reason by the opponents of surgery that operative treatment was too dangerous, and before the days of proper preparation the operative mortality was undoubtedly sometimes much too high. It is improbable that the mortality can ever be completely eliminated as long as surgeons consent (as they sometimes must) to act as a last resource in desperate cases. Mortality can, however, be reduced, even in these circumstances, to a point at which, for the average patient, the risk is negligible. Actually in my experience during the last four years, rectal avertin being used for basal narcosis, the mortality has been less than 2 per cent., the patients including a large number who were very ill indeed before treatment was begun. Those who have died were in every instance so ill that the danger of operating was equalled by the danger of doing nothing, so that a possibly fatal outcome was foreseen and faced. In these circumstances it seems fair to claim that modern surgery based upon the practice of Dunhill and other pioneers in this field has fully justified itself, so that it deserves consideration in the course of treating almost every patient suffering from toxic goitre.

Reference

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MYXŒDEMA

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THE condition produced by severe thyroid insufficiency in the adult was first named "myxœdema" by Ord (1877) and was the first of the endocrine disorders to be treated successfully by replacement therapy (1891). The very success of this method of treatment has led to a certain loss of interest in myxœdema as compared with its commoner counterpart exophthalmic goitre. Just as in the latter condition the narrower concept of exophthalmic goitre has been replaced by the wider "hyperthyroidism" or "thyrotoxicosis," so myxœdema is to be regarded as the maximal expression of thyroid inadequacy in the adult and may be included with the minor degrees of thyroid hypofunction under the general term "hypothyroidism." While fully-developed myxœdema is a relatively rare disease, it is probable that minor degrees of hypothyroidism are common, but such larval types of the condition have been less studied and are at present less certainly diagnosable than are the minor grades of thyrotoxicosis. It is not possible within the scope of this article to enter into any detailed account of the hypothyroid state, and it is proposed to deal with only certain aspects of the subject.

CLASSIFICATION AND ETIOLOGY OF HYPOTHYROIDISM

Thyroid inadequacy is due to a multiplicity of causes and at least five main groups may be recognised. (1) "Spontaneous myxœdema" and its minor grades. (2) Traumatic hypothyroidism. (3) "Exhaustion" hypothyroidism following on hyperthyroidism. (4) Pituitary hypothyroidism. (5) Hypothyroidism resulting from obvious local lesions of the thyroid.

In "*spontaneous*" *myxœdema* of adults the cause of the disease usually remains undetermined, though occasionally the condition may be definitely traced to an infection. I have, for instance, seen myxœdema develop after a streptococcal infection of the upper respiratory passages. Some authors, indeed, state that all severe acute infections may be accompanied by inflammatory changes in the thyroid, and that fibrotic changes in the gland may occur as the result of chronic disease. It is not improbable that functional failure of the gland may result from infective processes elsewhere. The damage, transient or permanent, caused by even mild infections in the diabetic is well recognized and the thyroid may be as liable to such injury as is insular tissue. All that can be said is that, when the victim of spontaneous myxœdema first comes under observation, no definite history of a provocative factor can usually be obtained.

The *traumatic form of hypothyroidism*, that is the condition of thyroid inadequacy following operations upon the thyroid, is becoming increasingly frequent. Since the operative mortality has been reduced to an almost negligible figure by improved technique, adequate preparation and suitable anæsthesia, surgical treatment of Graves' disease has become the rule rather than the exception, and the tendency is towards subtotal rather than partial thyroidectomy. Subtotal thyroidectomy, though amply justified by its results, is necessarily a crude procedure: no estimate can be formed of the functional efficiency of the remnant of the gland which is left, and a gland fragment which for a time suffices for a patient's needs may ultimately, owing to exhaustion or to degenerative processes, become inadequate. Temporary hypothyroidism may follow closely upon the operation and clear up more or less rapidly with hypertrophy of the residual tissue or with its recovery from operative trauma. Later definite myxœdema may supervene, and patients who have undergone the operation should be watched not merely from the point of view of guarding against recurrence of symptoms of hyperthyroidism, but also for symptoms suggesting thyroid inadequacy.

Total thyroidectomy is now advocated in the treatment of angina pectoris and of certain forms of uncompensated heart disease. After operation no attempt is made to restore the basal metabolism to a normal figure, but enough thyroid is administered to alleviate symptoms of myxœdema, while the patient remains in a definitely hypothyroid condition, surprisingly small doses of thyroid being adequate for this purpose. Lastly, traumatic hypothyroidism may develop after the surgical treatment of large colloid goitres, and after irradiation treatment of toxic goitre.

In *exhaustion hypothyroidism,* thyroid inadequacy untimately supervenes in untreated hyperthyroidism, and local diseases of the thyroid, such as acute thyroiditis and lymphadenoid goitre may also be followed or accompanied by thyroid insufficiency.

In any discussion of the causes of dysfunction of the thyroid, it is impossible to avoid mention of certain recent advances in endocrinology which have broadened the conception of the possible factors underlying changes in thyroid activity. The discovery of a hormone in the anterior lobe of the pituitary body capable of stimulating the thyroid to activity, has naturally suggested the possibility that pituitary disorders may sometimes be the cause of hyper- or hypofunction of the thyroid. While it would be unjustifiable at present to press this hypothesis too far, there can be little doubt that in certain forms of pituitary disease alterations of thyroid activity play an important part in the production of the symptom complex. Thus, in Cushing's syndrome (pituitary basophil adenoma) the low basal metabolic rate, the cutaneous symptoms, and possibly the menstrual disturbance, may reasonably be attributed to the accompanying atrophy of the thyroid : in pituitary obesity signs of hypothyroidism may appear, and even in acromegaly myxœdema may complicate the picture. Until further evidence is available it is unwise to dogmatize, but it is obvious that, in seeking for the cause of otherwise unexplained hypothyroidism, the pituitary factor must be considered and conversely that the possibility of co-existent thyroid inadequacy should always be borne in mind in the treatment of pituitary disorders.

THE BASAL METABOLIC RATE IN MYXŒDEMA

In the complete absence of thyroid tissue the amount of heat produced by the body, fasting and at rest, falls to about half the normal quantity; the activity of the thyroid is therefore responsible for about 40 to 50 per cent. of the total calories produced by the organism under these conditions. Thus in complete thyroidectomy for the relief of angina pectoris rates as low as minus 40 to minus 47 per cent. are recorded in a proportion of the patients, though in many cases the reduction of the metabolism is considerably less. The fall in the metabolic rate following the operation is slow and may continue for two months; at a basal metabolic level of minus 25 to minus 30 per cent. symptoms of myxœdema, that is of severe hypothyroidism, begin to appear and small doses of thyroid are then needed for the patient's comfort.

The reduction in the basal metabolism is accompanied by a rise in the cholesterol content of the plasma, which in hyperthyroidism is below the normal level. It has even been contended that the level of the plasma cholesterol affords a more valuable index of the progress of hyper- and hypo-thyroid conditions than does the basal metabolic rate, owing to the difficulties inherent in the determination of the basal heat production. While it is possible that changes in the plasma cholesterol content may prove a dependable guide in the treatment of derangements of thyroid activity, the absolute level in any case is of little significance: the plasma-cholesterol content is affected by such a number of morbid conditions that estimates of this substance have little if any diagnostic value.

Determinations of the basal metabolic rate are used both in the diagnosis and treatment of hypothyroid conditions. Treatment should ideally be controlled by such determinations, with the object of restoring the metabolic rate to an approximately normal level by suitable adjustment of thyroid dosage, and of maintaining it at that level indefinitely. Actually such control of treatment is not usually possible and it is customary to estimate the necessary dose by observation of the patient's symptoms and appearance—a method which has yielded excellent results in the past and which may still be justifiably employed, though if possible a basal metabolic estimation should be made as a check on the dosage finally selected.

In diagnosis the method has its limitations. In cases of fully-developed myxœdema, the disease can usually be diagnosed by inspection. If there is any doubt the basal metabolic rate will afford useful confirmation, but such confirmation is rarely needed. In the detection of the minor degrees of thyroid inadequacy, the diagnostic value of the basal metabolic rate is limited. In the first place, a low basal metabolic rate is by no means confined to sufferers from thyroid insufficiency. Low rates are met with in Addison's disease, eunuchoidism and pituitary disorders; and in malnutrition and in patients on reducing diets the rate may fall to minus 20 per cent. or less. Occasionally, too, individuals are met with in whom no explanation can be found for an abnormally low basal metabolic rate.

In one patient under my care, a neurasthenic with a slight grade of hypertension, the basal metabolic rate was persistently below minus 20 per cent. : no stigmata of hypothyroidism were present and his symptoms were aggravated rather than improved when his basal metabolic rate was raised to an approximately normal level by thyroid administration.

Rates between minus 20 and minus 25 per cent. may even be encountered in persons who are, to all appearance, perfectly healthy. Secondly, the basal metabolic rate in any individual patient has a relative rather than an absolute value. It is well known that in any group of "normal" individuals basal rates will be obtained varying from the mean standard by minus 10 or plus 10 per cent. If therefore in investigating the metabolism of a case of suspected hypothyroidism a rate of minus 10 per cent. is found, two possibilities must be considered :—the rate may be normal for the individual in question, or, if his "normal" rate in health is plus 10 per cent., a very considerable depression of his metabolism may have occurred. Lastly, the determination of the basal metabolic rate is not entirely free from error, especially in patients who have had no previous experience of the apparatus, though such errors are usually on the plus side and will therefore tend to mask abnormally low rates. It may be concluded that, while a normal or raised basal rate may be taken as negativing the presence of hypothyroidism, a moderate depression of the rate to the neighbourhood of minus 20 per cent. does not necessarily indicate thyroid inadequacy; at levels somewhat below this clinical signs of hypothyroidism begin to appear and the diagnosis becomes possible without the use of the metabolism apparatus.

THE VASCULAR SYSTEM IN HYPOTHYROIDISM

The circulatory system is definitely affected by thyroid inadequacy, a fact which has been emphasized by Zondek. These vascular changes are of especial interest at the present moment when total thyroidectomy is advocated as a palliative in certain types of cardio-vascular disease. The pulse is slow, often below 60; the heart is enlarged, dilatation of both ventricles being present, and its minute output is small. The electro-cardiogram shows characteristic alterations, the P-wave being small or absent and the T-wave flattened or inverted. The vasomotor response to cold is much diminished. Under thyroid treatment the size of the heart diminishes and the electrocardiogram resumes a normal form. The blood pressure is variable, in many of the older patients the blood pressure is raised, possibly as the result of co-existent essential hypertension; in younger patients a low systolic pressure with a low pulse-pressure is frequently present and is probably more characteristic of the disease.

These circulatory changes are, as might be expected, the counterpart of those observed in hyperthyroidism with its rapid pulse, high minute-output, marked vasomotor response and high pulse-pressure. Recent work suggests that the action of the thyroid secretion on the heart is twofold : in the first place a direct action upon the cardiac muscle increasing its rate of contraction and possibly directly producing hypertrophy, secondly a sensitization of the heart to the action of adrenaline. With thyroidectomy, the work of the heart decreases and the metabolism of the heart itself falls, but the sensitivity to adrenaline is stated to remain at a normal level: if this proves to be the case any improvement which occurs after total thyroidectomy in patients with chronic cardiac lesions must be regarded as independent of changes in the sensitivity of the heart to adrenaline discharge.

Occasionally circulatory embarrassment may be the presenting symptom of the hypothyroid state, just as in hyperthyroidism the cardiac symptoms may almost completely overshadow the picture, and other signs of the condition be so inconspicuous that the diagnosis is missed. The combination of otherwise unexplained cardiac dilatation with a slow pulse and a low systolic blood-pressure should suggest the possibility of an underlying hypothyroidism, and lead to a search for confirmatory evidence. A therapeutic test with small doses of thyroid will, if it leads to a diminution in the heart-size and the disappearance of symptoms, confirm the diagnosis.

In myxœdema anæmia is frequently present and may be either of the hypochromic or hyperchromic type. The available evidence does not permit of a conclusion as to the part, if any, played by the thyroid in blood formation : it must be remembered also that achlorhydria is frequent in myxœdema and that this may be the determining factor in the production of the anæmic state. Cases have been described in which pernicious anæmia and myxœdema co-existed, and it is stated that in such patients a completely normal blood-picture is only regained when thyroid is administered in addition to the usual liver therapy. The leucocyte count is little altered, but, as in hyperthyroidism, a relative lymphocytosis may be present.

THE MINOR FORMS OF HYPOTHYROIDISM

At one time or another almost every symptom encountered in disease has been put down to lack of thyroid secretion, and the literature abounds in ill-controlled observations on the effect of thyroid treatment. Among conditions which have been attributed to thyroid inadequacy are constipation, anæmia, arthritis, deafness and tinnitus, obesity of moderate degree, headache, cardio-vascular disorders, alopecia, menstrual disturbances, pruritus, ichthyosis and various psychoses. Many of these symptoms undoubtedly occur in myxœdematous patients, but the fact that an isolated symptom such as pruritus or headache happens to disappear during a course of thyroid treatment is no proof that it is produced by a thyroid insufficiency. In the absence of more exact methods of diagnosing hypothyroidism than are at present available, it is reasonable to demand that some confirmatory evidence of the hypothyroid state should be present, before the presenting symptom is necessarily attributed to thyroid inadequacy : among the more important stigmata of the hypothyroid state are a harsh dry skin, tendency to loss of hair, gruffness of the voice, puffiness of the eyelids, tendency to gain in weight, mental sluggishness, and undue sensitivity to cold. If some or all of these are present in addition to the particular symptoms complained of, and if the basal metabolic rate can be shown to be definitely on the minus side, significance can obviously be attached to the result of the therapeutic test with thyroid: a basal metabolic rate in excess of the normal definitely excludes hypothyroidism. Menstrual disturbances, unexplained physical and nervous exhaustion and the cardiovascular symptoms already alluded to are conditions in which the possibility of thyroid inadequacy must be borne in mind.

DIAGNOSIS

In fully-developed myxœdema the diagnosis may be made at sight, but it is undoubted that, though so obvious, the condition is often overlooked. This is in part due to the fact that untreated myxœdema is a relatively rare disease in this country, and in consequence the practitioner is not on the look out for it, and in part to a superficial resemblance between the appearance of the myxœdematous patient and that of the chronic interstitial (ischæmic) nephritic. The myxœdematous facies resembles that of chronic nephritis in the puffiness of the eyelids and in the sallowness of the complexion, and the possibility of confusion is increased by the fact that slight albuminuria is common in myxœdema, that hypertension may be present, and that occasionally true pitting œdema of the legs develops. When once a mistaken diagnosis has been made in a disease which is either recognized at first glance or missed entirely, the error is usually persisted in and the patient's only hope lies in a second opinion. Apart from chronic nephritis there are few conditions with which fully-developed myxœdema is likely to be confused. The difficulty of diagnosing minor forms of hypothyroidism has already been emphasized. Though the basal metabolic estimation is a useful adjuvant, and the therapeutic test, under reasonable control, decisive, the original diagnosis largely depends on the clinical findings. Of considerable importance is the sensitivity to cold shown by the patients: the maintenance of the body temperature under conditions of inadequate heat production is a more difficult problem than the increased dissipation of heat necessitated by the high basal metabolism of thyrotoxicosis. Lastly, if hypothyroidism is suspected, there need be no hesitation in administering thyroid in small doses, since under proper control this is an entirely harmless procedure.

TREATMENT

The main standby in treatment is still desiccated thyroid. Thyroxine and its monosodium salt are relatively insoluble and, when dissolved in alkaline solutions, are unstable. Thyroxine and thyroxine monosodium given orally have only a slight effect on the basal metabolic rate, and it is stated that about the same increase in the basal metabolic rate of the myxœdematous patient is produced by oral administration of desiccated thyroid as by thyroxine given intravenously, on the basis of equal iodine content. It would seem that in the digestion of desiccated thyroid peptides and polypeptides of thyroxine are formed, which have a wider range of solubility than the purer product. This being so, it would seem advisable to employ the ordinary desiccated thyroid in routine treatment, reserving thyroxine and its salts for cases, if any, in which oral administration is not possible. At the beginning of the treatment of myxœdema it is best to start with a small dose such as ½ grain daily, increasing gradually until the full maintenance dose of 2–3 grains daily is reached. The necessary maintenance dose can usually be estimated by clinical observation, though if possible a check of the basal metabolic rate should be made. During the summer months a slight reduction of the maintenance dose is advisable. It is an interesting fact that substances, such as dinitrophenol, which produce a rise in the basal metabolism, when so used as to restore the basal metabolic rate of the myxœdematous patient to a normal level, have no beneficial effect upon the symptoms of the condition.

DISEASES OF THE THYROID GLAND IN CHILDREN

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THE most important diseases of the thyroid gland in children are those in which its secretion is absent, deficient, or excessive, and with the goitre of puberty and simple goitre these are dealt with in the following article, but inflammatory conditions and new growths of the gland are omitted.

SPORADIC CRETINISM

Clinical features.—The baby appears to be normal at birth, and the condition can never be recognized before the sixth and seldom before the twelfth week, when the thyroid secretion derived from the mother has been dissipated. The earliest symptom is apathy which steadily increases. At first the mother thinks her baby is unusually placid and contented, but later on realizes that its stillness and lack of interest are unnatural. Then the physical changes, which are diagnostic, begin to make their appearance and become more and more obvious. The features become coarse, the nose broadens and the nostrils become flattened, the mouth becomes large and the lips thick and bluish in colour, and puffiness of the eyelids develops and increases until the palpebral fissures are mere slits. The complexion becomes pasty, the hair dry, and the tongue broad. Occasionally the enlargement of the tongue is so great that it cannot be withdrawn into the mouth, and I have seen a tongue, purplish in colour, projecting more than an inch beyond the lips. There is general thickening of the mucous membranes, and the cry may become hoarse. The extremities are cold and often a little cyanosed; the abdomen becomes protuberant and an umbilical hernia is generally present. Constipation is an early and constant feature of the disease. If no treatment is given, the child is late in sitting up, late in standing, walking, and talking, and the eruption of the teeth is so much delayed that a child may reach the age of two years before it cuts its first tooth. The fingers are broad and square at the tips, and the skin of the fingers and hands is dry and the lines are coarse. Owing to the thickened skin the forehead is thrown into deep wrinkles, and, when the child smiles, the smile is peculiarly slow. Growth is delayed, the legs tend to be bandy, and the neck appears to be unduly short owing to the pads of fat, which develop above the clavicles. If still untreated the cretin reaches adult life dwarfed in stature, imbecile, and sexually infantile; but fortunately cretinism is almost invariably diagnosed before the age of three years and the lamentable sight of an older one is now rare.

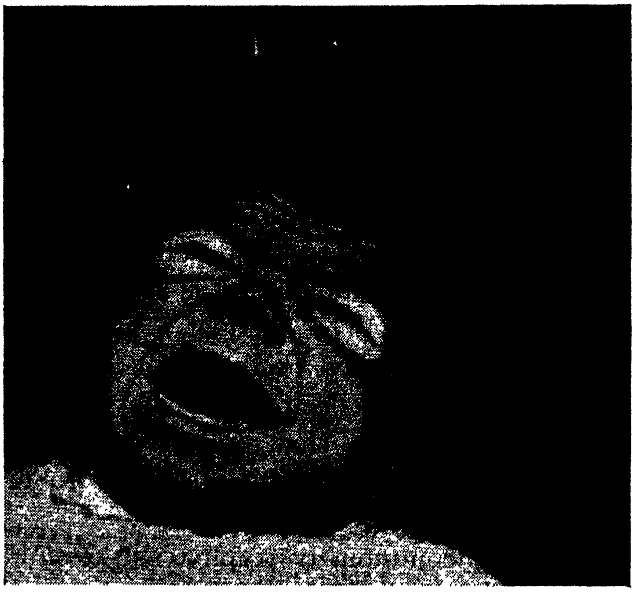

FIG. 1.—Cretin, aged 3 months, showing wrinkled forehead and puffy eyelids.

Differential diagnosis.—The usual mistake is to diagnose a mongol as a cretin, but occasionally the more serious error of mistaking a cretin for a mongol is made. Mongolism is recognizable at birth, but the signs of cretinism do not appear until the sixth to the twelfth week. The mongol is active, quick in its movements and interested in its surroundings, the cretin is slow and dull and takes little notice. The mongol's small face with slanting eyes, epicanthic folds, and button-like nose is easily distinguishable from the large face with puffy eyelids, broad flat nose and large mouth with thick lips, which characterizes the cretin. The mongol's tongue is frequently protruded, but it is pointed and small; the cretin's tongue is large and broad and is only protruded when there is no room for it inside the mouth. The fingers of a mongol, like those of a cretin, are short, but are not broad and square at the tips. The simian line, a crease running straight across the palm, is common in one or both hands of a mongol, but is as rare in a cretin as in a normal child. The head of a mongol is very short with an ill-developed occiput, whereas that of a cretin is large with the occiput well developed. The differences are so great that only those, who have never seen an untreated cretin, are likely to make a mistake in diagnosis.

There is an uncommon dystrophy, as yet unnamed, which is nearly always diagnosed as cretinism. Mental deficiency, a large head with heavy features and dry hair, short broad fingers, and a large abdomen all help in giving a superficial resemblance to cretinism, but further examination reveals the presence of splenic and hepatic enlargement, and opacity of the cornea like ground glass in appearance. X-rays also show that all the bones in the body are abnormal. A lateral view of the spine is the most helpful and shows irregularity in the size and shape of the bodies of the vertebræ.

There should be little difficulty in diagnosing achondroplasia from cretinism even in babyhood. The absence of a bridge to the nose and the shortness of the fingers may mislead for a moment, but the lively disposition and the normal size of the head and trunk with extreme shortness of the arms and legs are unmistakable.

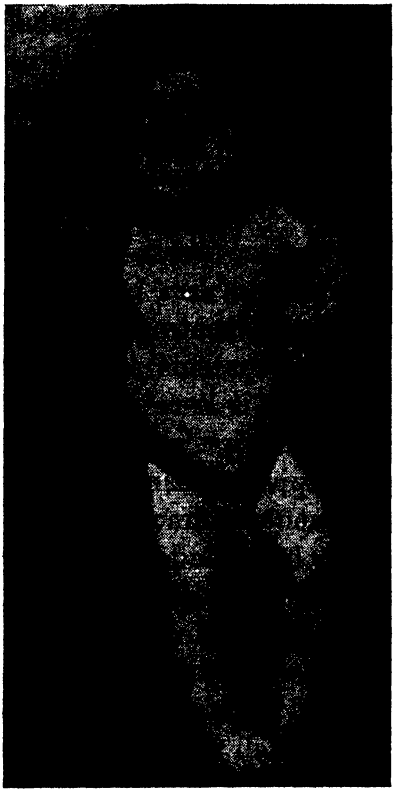

FIG. 2.—Cretin, aged 3 years. Had one month's treatment at two years of age.

Treatment.—As soon as cretinism is recognized or even suspected treatment should be started. Thyroid should be given in very small doses at first and increased rapidly, if it is well tolerated. It is best to begin with a tenth of a grain twice daily, and after three days give it three times a day. Then the dose is increased every week until half a grain is given three times daily. Improvement is rapid and should be very obvious in three or four weeks. The optimum dose varies and in arriving at it one must be guided by the clinical signs and symptoms. There should be a steady gain in weight, regular action of the bowels, and no disturbance in general health. Loss of weight and diarrhœa are the two most useful indications of overdosage. Occasionally a baby is very intolerant even of the smallest dose, and with every increase much loss of weight, diarrhœa, and general disturbance of health take place. In such cases it is necessary to proceed with extreme caution, allowing the child time to recover the lost weight and add a little more before any further increase in the dose is made. With perseverance larger and larger doses are tolerated and each increase causes less and less disturbance until at last an adequate amount can be given.

Thyroid must be administered without intermission and as soon as a child is old enough to co-operate it is useful to have an estimation of the basal metabolic rate. As a rule it will be found that it is very little above or below the normal, and that one's judgment of the child's requirements by clinical means has been remarkably correct. Many practitioners stop giving thyroid, if a child has one of the specific fevers or any other febrile illness, but there is no good reason for withholding it in any circumstances.

Prognosis.—In general the earlier treatment is begun the better the outlook, and it is for this reason that early diagnosis is so important. It is true that so long as treatment has been started in the first year or two the physical signs of cretinism disappear entirely, but the effect on the mental development is much less satisfactory. Even in babies who have had an adequate dose of thyroid from the second or third month onwards the result is sometimes most disappointing, and the intelligence may be subnormal or even abnormal. The majority always remain a little below the average in mentality, but some respond so well that they become indistinguishable either mentally or physically from normal people of their own age. Even in the case of cretins treated for the first time between the ages of one and three years the response is sometimes unexpectedly good. They may become normal in appearance and attain an average level of intelligence and on reaching adolescence are capable of earning a living in competition with their normal contemporaries. If, however, treatment is not instituted until the later years of childhood neither the appearance nor the mentality ever becomes normal, though the improvement in looks and in height may be considerable.

ENDEMIC CRETINISM

This is now very rare in Great Britain and the endemic centres are becoming more and more restricted with the improvement in the water supply to the affected villages. The chief clinical difference from sporadic cretinism is the presence of a goitre, which may be of large size and in some cases may cause paroxysmal or continuous dyspnœa. Deaf-mutism is occasionally caused by endemic, but never by sporadic cretinism. Treatment and prognosis are much the same for both types. Endemic cretinism may be prevented by a pure water supply, and if this is not obtainable the water should be boiled and filtered. Iodine in small doses may be administered to pregnant women in endemic centres.

HYPOTHYROIDISM

The term is used for various degrees of thyroid inadequacy short of the complete absence of secretion found in cretinism. It is often congenital, but may be acquired as a result of infection, and is not uncommon in regions where endemic goitre occurs. When the deficiency of secretion is great, diagnosis is almost as easy as in cretinism, though it is unlikely to be made at so early an age, but the prognosis is much better in that the intelligence is likely to become normal or but little below the normal level after thyroid treatment has been given.

The symptoms and signs in the milder cases are much later in their appearance than in cretinism, and may not be recognizable until the age of four years or later, and they are, of course, never so pronounced. Delay in growth is usually the effect which first attracts attention, but in various types of dwarfism growth is equally slow, and, if there is deficient secretion of the anterior lobe of the pituitary gland, it is quite as great. Some degree of mental backwardness, a dullness of intellect with lack of interest in its surroundings, nearly always accompanies the slowness of growth in a child with hypothyroidism, and this distinguishes it from most forms of dwarfism and from hypopituitarism, unless this is caused by a suprasellar tumour. The child with hypothyroidism is not only unwilling to play with others, but is easily tired and actually incapable of holding its own with normal playmates.

Other signs which may be helpful are pastiness of the complexion, a little widening of the nostrils and a broad flat bridge to the nose, slight coarseness of the features, and dryness of the skin. There may even be a little puffiness of the eyelids. Undue susceptibility to cold and chronic constipation are common symptoms. Though any of these signs and symptoms may occur in other conditions, the presence of two or more of them, especially in association with slowness of growth or mental dullness, should lead to a strong suspicion that they are caused by hypothyroidism. Absence or deficiency of the hair of the outer half of the eyebrows is thought by some to be pathognomonic of thyroid deficiency, but it is found in normal children and is of no greater value than any of the other signs enumerated above. X-ray examination of the bones has proved that there is always considerable delay in ossification in hypothyroidism, and is a most valuable aid in diagnosis. In older children an estimation of the basal metabolic rate is helpful if carried out by an experienced observer, for thyroid deficiency is perhaps the most potent cause of a lowered basal metabolic rate.

It is sometimes impossible to be certain whether the signs and symptoms which have attracted attention are due to a slight degree of hypothyroidism or to some other cause, and in such cases the therapeutic test should be applied. No harm can be done by giving thyroid for three months and observing its effects, if the child is kept under careful supervision. If the child is really suffering from thyroid deficiency there will be a definite change for the better in the first month and the improvement will continue. The practitioner, however, should satisfy himself that he can see an improvement in the physical or mental state, before making a final diagnosis of hypothyroidism, and should not place too much reliance on the observations of the parents. They are apt to mistake changes due to the increasing age of the child, especially if it is very young, for the effect of the drug.

JUVENILE MYXŒDEMA

The term is reserved for cases of complete cessation of thyroid secretion and is very rare. As a rule it is the sequel to some acute infection. A child, who has been normal, becomes greatly changed in appearance and disposition. Growth ceases or becomes very slow, the complexion becomes sallow, the nose broadens, the voice becomes hoarse, and the clinical picture closely resembles that of congenital cretinism. The mental processes become slower, but the child is never reduced to the state of imbecility so characteristic of a cretin. The sooner treatment is begun the better the prognosis. If started quickly the child on reaching adult life will be little different from his fellows in height, appearance, and intelligence, but if allowed to remain myxœdematous for long he will always show in all three respects some signs of his deprivation. Thyroid should be given with great caution at first, but if no untoward symptoms occur, the dose can be increased rapidly.

THYROTOXICOSIS

A severe degree of thyrotoxicosis is rare in childhood, but a mild degree is not uncommon, though it is easily overlooked. There are one or two records of congenital thyrotoxicosis, but it seldom begins before the age of four years and the incidence gradually rises with each succeeding year. A family history of the disease in ascendants or collaterals is more often obtained than with adult sufferers, and excess of females with it is much less in childhood, boys being almost as often affected as girls.

Clinical features.—In some cases all the classical signs and symptoms are present, enlargement of the thyroid gland, tachycardia, tremor, exophthalmos, loss of weight, nervousness, and sweating. Sometimes in place of tremor there are irregular movements not unlike those of chorea. There is some degree of muscular weakness and the child becomes easily fatigued and may complain of palpitation of the heart. In severe cases there may be emaciation, the

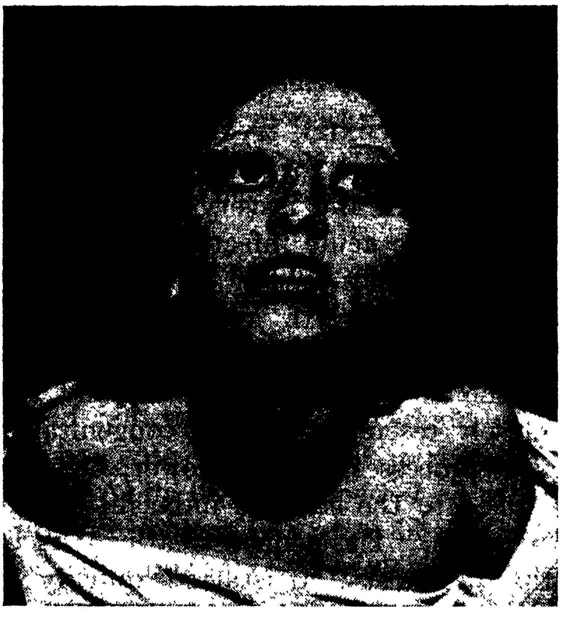

FIG. 3.—Thyrotoxicosis, aged 7½ years. Severe case which required operation.

hair may become lustreless and fall out, and the temperature may be slightly raised. In some cases, especially in the milder ones, there may be no exophthalmos and the enlargement of the thyroid gland may be quite inconspicuous.

Differential diagnosis.—If the thyrotoxicosis is severe it cannot be overlooked or mistaken for any other condition. The milder cases in which there is no exophthalmos and little swelling of the gland are frequently mistaken for cases of functional nervous disease. The nervous child is far commoner than the child with thyrotoxicosis and may be as emotional, excitable and easily tired and may have as rapid a pulse after slight exertion or excitement. The rapid pulse, especially if it is accompanied by palpitation of the heart or extrasystoles, may lead to a diagnosis of myocarditis.

In every case there will be some thyroid enlargement, and in many there will be slight widening of the palpebral fissures, even if there is no exophthalmos, and irregular movements or tremor are likely to be present. In doubtful cases estimation of the basal metabolic rate is of the greatest value and in children will probably lie between plus 30 and plus 70.

Treatment.—Mild cases and some of greater severity may recover completely with rest and quiet. The child should be kept in bed until the general condition has improved and the pulse rate has become lower. After he is allowed up he should have breakfast in bed, lie down for a couple of hours in the afternoon, and go to bed early. He should be kept away from school and from all excitements, such as parties and cinemas, for many weeks or months, and the return to normal life should be very gradual. If any signs or symptoms return it will be necessary to give a further period of rest. Lugol's iodine in doses of 5 to 10 minims three times a day will effect a great improvement in most of the cases.

Very severe cases are unlikely to recover completely without operative treatment, and an early operation will avoid a long and tedious illness and a serious interference with education. The operative risks are certainly no greater than with adults and are probably less. The child should be kept in bed until some improvement has taken place and should then have a pre-operative course of Lugol's iodine, as for an adult. The best time for operation can be determined by the fall in pulse rate and the general improvement, but a more exact method is to have the basal metabolic rate estimated two or three times during the period in which iodine is being given. When it has fallen nearly to the normal level operation can be performed with the least risk. In the worst cases a subtotal thyroidectomy will be found necessary. I have seen removal of half the gland followed by a period of great improvement, but after a few months the pulse rate rose and all the signs and symptoms of thyrotoxicosis returned, though not to their previous extent, and the basal metabolic rate rose to plus 34. After removal of the other half of the gland a permanent cure resulted.

The most difficult cases to treat are those of intermediate severity. In these it is best to try the effect of prolonged rest and quiet, but to withhold Lugol's iodine until the improvement makes it unlikely that operation will be necessary or until it is decided that operation is required owing to lack of any decided change for the better. The following report shows that even a severe case may make a perfect recovery without operation.

A boy, V.H., was seen in June, 1930 at the age of five years. There was a history of thyroid enlargement at four and prominence of the eyes and excitability at four-and-a-half years of age. His pulse rate was 140 and he had all the signs and symptoms of severe thyrotoxicosis. In July after a period of rest his teeth were extracted and his tonsils removed, and on three occasions he had X-ray treatment. From May to August 1931 his basal metabolic rate was between plus 56 and plus 36, but his general condition was improving and his pulse rate was falling. In October 1931 his basal metabolic rate was minus 4, and since then has varied between minus 9 and plus 2, and he has been free from any definite signs of thyrotoxicosis, though the gland is still slightly enlarged and the eyes a little prominent. He is still very slim, tall for his age, and delicate in appearance.

Not infrequently after operation a child becomes obese with an unhealthy bloated appearance and its basal metabolic rate falls below normal. Small doses of thyroid should be given, and as a rule the dose can be reduced after a time and finally dropped altogether, when the ductless glands have readjusted themselves. The child will then be healthy in appearance, and the only sign likely to persist is slight exophthalmos. If operation is refused a course of X-ray treatment may be given with advantage, for, though it seldom brings about a complete cure, it causes some improvement in the majority of cases.

Some children with thyrotoxicosis have septic teeth or tonsils, which aggravate the condition. If thyroidectomy is decided upon, it is better to remove the tonsils or diseased teeth after rather than before it has been performed, but, if no immediate operation on the thyroid is contemplated, the septic foci should be dealt with as soon as the general condition has been improved by a period of rest in bed.

Prognosis.—The prognosis depends largely on the treatment. In mild cases it is good and even in the most severe ones the recent advances in anæsthetic and surgical technique have removed most of the dangers of thyroidectomy. The mortality is now very low and those successfully operated on make a complete or almost complete recovery.

SIMPLE GOITRE

This is not very rare, and in some families, which I have seen, it is inherited as a Mendelian dominant. These families have lived in London or in other places, where endemic goitre is unknown. Like most hereditary conditions, however, it may affect a single member of a family, and the diagnosis is less obvious. Apart from a general enlargement of the gland there are no signs or symptoms of hypothyroidism or of thyrotoxicosis and no ill effects are felt in later life. I do not consider that any treatment is required.

GOITRE OF PUBERTY

This is not uncommon, especially in girls, and, though it is symptomless, it indicates that the thyroid gland is unable to maintain an adequate secretion without hypertrophy. Small doses of potassium iodide or iodine in the form of the tincture are advisable, and iodex ointment may be rubbed gently into the skin over the gland. As puberty becomes established the enlargement of the thyroid often disappears, but careful watch should be kept for any signs or symptoms of thyrotoxicosis, and if they appear suitable treatment should be begun without delay.

The illustrations are from the photographic department of the Hospital for Sick Children, Great Ormond Street.

THE BASAL METABOLIC RATE: ITS MEANING AND INTERPRETATIONS

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IT must be clearly understood at the outset that there is a difference in meaning between the terms " metabolism " and " basal metabolic rate " (B.M.R.). The B.M.R. is metabolism studied under special and definite conditions. The word " metabolism " is derived from the Greek, meaning "change." The process of metabolism takes place in cells throughout the body and continues until these cells lose that power. The phrase " power to metabolize " carries the same sort of meaning as the " fermentative power of yeast," and does not imply the expenditure of any energy. Of what value is this " power to metabolize " possessed by certain cells? It will be remembered that energy cannot be created and cannot be destroyed. Where it is active now, then elsewhere it must have been potential, so that the sum total of energy is always the same. The different forms in which energy are found are: (1) potential energy; (2) mechanical energy or work; (3) light; (4) heat; (5) electricity; (6) magnetism.

When certain cells are said to have " power to metabolize " it is meant that they have power to change one form of energy into another and more useful form. It is the chemical change of one form of energy into another which is metabolism. An illustration may be taken in the case of food—a well-known example of potential energy, and its changes or metabolism can be traced. The three types of foodstuffs are protein, fat and carbohydrate. After digestion has occurred, their end-products unite with oxygen. This union is only made possible by the controlling influence of the metabolizing cells of the body. As a result of this union of oxygen with the end-products of food (called combustion) heat is produced and carbon dioxide is evolved. It must be clearly realized that the absorption of oxygen does not cause metabolism, but that the degree of metabolism decides what amount of oxygen is to be absorbed. Thus the potential energy *food* has been changed into another form of energy, namely, *heat*. This heat may be transformed into other forms of energy: e.g. the glow-worm requires light; some fish require electricity; but the primary function of the human organism is to provide heat in order to keep the body warm, and so heat is the main form into which the potential energy is changed. Other functions, however, are also carried out in the body, for example, the work of the heart in pumping out blood, and thus some of the heat from combustion is transformed to another form of energy, namely, mechanical energy or work. This mechanical energy, however, is once more reconverted to heat which is produced by the friction of the blood on the capillaries. It has thus been shown that the body is constantly producing heat, and as the temperature of the body remains constant at 98·4° F. it follows that the body must constantly be losing that heat. So a means of determining heat production of the body is possible by measuring heat loss, because these must be equal.

The various steps in metabolism may thus be summarized:—

1. Power of certain cells to metabolize. (Equivalent to fermentative power of yeast, and no energy is required.)
2. Food—potential energy.
3. Digestion of food.
4. Union of end-products of food with oxygen, by reason of the power of metabolizing cells. The union with oxygen produces carbon dioxide and *heat*—energy.
5. The heat is partially converted in various parts of the body

to *mechanical energy*, e.g. heart's pumping action.

6. This mechanical energy is again converted into *heat*, e.g. when the heart pumps out blood, heat is produced by the friction of the blood upon the capillaries.

7. Thus *heat* is the final form of energy in the body.

Thus it can be seen that the amount of metabolism that has occurred or energy that has been transformed, can be measured by (*a*) the actual heat lost; (*b*) the oxygen consumption; or (*c*) the carbon dioxide produced. It is usual to speak of (*a*) as direct calorimetry, and (*b*) and (*c*) as indirect calorimetry.

By 1774 Priestley had discovered oxygen and a few years later Lavoisier applied this discovery and made the first experiment in metabolism. He noted that if an animal was completely enclosed it used up the oxygen in the enclosed space and eliminated carbon dioxide. In addition to this, however, he discovered that the heat produced by the animal was equal to that given off by the oxidation of an equivalent amount of carbon in the carbon dioxide produced. Thus, by the end of the eighteenth century there was recognized a relationship between direct and indirect calorimetry.

METHODS OF MEASURING THE METABOLISM

1. *Direct heat measurement.*—In order to carry this out, it would be necessary to work on the principle of the bomb calorimeter. The subject is enclosed in a metal chamber which is immersed in a known amount of water and the rise in temperature of the water is noted. Such apparatus is, however, cumbersome and expensive.

2. *Indirect measurement of heat.*—It will be remembered that the three classes of substances, protein, fat and carbohydrate, produce, as a result of oxidation, carbon dioxide. Each of these substances yield a specific amount of heat per gramme, as a result of the chemical action. Below is given a table showing the connection between the gaseous exchange and the heat production. The amounts given are per gramme of

substance.

TABLE 1.

Carbon dioxide and oxygen and heat production when one gramme of fat, protein and carbohydrate are metabolized. These figures are obtained from actual combustion of these substances in a bomb. calorimeter.

	CO_2 (c.cm.)	O_2 (c.cm.)	R.Q. i.e. (CO_2/O_2) Ratio.	Calories of heat produced.
Fat	1,452	2,040	·713	9·54
Protein ...	793	980	·809	4·40
Carbohydrate ...	832	832	1·000	4·20

From the above table it can easily be calculated what the calorific values of a litre of carbon dioxide and oxygen are at the various R.Qs., i.e. at R.Q. 0·713 (fat combustion) 1,452 c.cm. of CO_2 are produced after 9·54 cals. of heat, therefore 1,000 c.cm. of CO_2 are produced after 6·56 cals. of heat. The values may conveniently be tabulated.

TABLE 2.

R.Q.	Calorific Value of 1,000 c.cm. of CO_2.	Calorific Value of 1,000 c.cm. of O_2.
0·713	6·56	4·67
0·809	5·55	4·49
1·000	5·05	5·05

It is noted, therefore, from table 2 that the calorific value of a litre of carbon dioxide can vary from 6·56 (R.Q. 0·71) to 5·06 (R.Q. 1·00), or as much as 30 per cent., depending on the character of the food burned, whereas the calorific value of a litre of oxygen only varies from 4·67 (R.Q. 0·71) to 5·05 (R.Q. 1·00) or a difference of 7 per cent.

METHODS OF INDIRECT MEASUREMENT

(*a*) By carbon dioxide produced.—The older investigation employed the carbon dioxide output as a measure of the metabolism because it was the easiest to carry out. It consisted merely of breathing into a solution or container which could trap the carbon dioxide. From the previous table, however, it can be seen that great errors were liable to arise in attempting to predict the calories of heat from the carbon dioxide production when a difference of 30 per cent. could exist in these values. The error was too great.

(*b*) By measuring the oxygen consumption.—This is now the method of choice in most laboratories, and two methods are generally employed.

1. The open circuit method.—In this method the subject breathes into a bag (as described by Douglas) for a known number of minutes. The expired air, after collection, is measured and a sample taken for analysis. The R.Q. is calculated from the analysis of the carbon dioxide and oxygen and the calorific value of the oxygen consumed is determined.

2. The closed circuit method.—In this method the determination of the respiratory quotient is disregarded and oxygen absorption alone is determined. The R.Q. is assumed to be 0·825, and hence the calorific value of oxygen is calculated as 4·825 calories per litre. It is not proposed here to enter into the arguments for and against this assumption of an R.Q., but suffice it to say in actual practice that no great error can arise, for we have already seen that with R.Qs. which vary as much as from 0·71 to 1·00 only a difference of 7 per cent. exists in the calorific value of the oxygen.

Standard conditions for estimating the metabolism.—There are various factors which influence the metabolism of the body, and the chief of these are food and digestion, work, rest, heat, cold and fever. The normality of any metabolic rate can only be determined if certain standard conditions are carried out, and it is essential that these standard conditions be observed on all subjects investigated. The standard condition employed is called "basal," and the metabolism measured is called the Basal Metabolic Rate, with the abbreviation B.M.R.

THE BASAL METABOLIC RATE

The metabolism is studied after the following conditions have been obtained:—

1. *Post-absorptive condition.*—It is essential that the subject shall have fasted for twelve to fourteen hours. Certain investigations have shown that a small non-stimulating breakfast of bread and butter and caffeine-free coffee caused no demonstrable rise in heat production after the second hour, but it is the custom in the

Courtauld Institute, Middlesex Hospital, to insist on an absolute fast.

2. *Muscular and mental repose.*—Absence of muscular movement is essential to an accurate determination, but it is equally important that there must not be any effort to remain absolutely motionless. Too often patients try to obtain a rigid posture and appear afraid to make the slightest move. The movements to be avoided are sitting up, and raising the legs. Mental relaxation is also difficult to obtain, and to realize this, the test may have to be repeated several times.

3. *Preliminary rest period.*—In the absence of severe muscular exercise, twenty to forty minutes is sufficiently long to produce basal conditions.

4. *Normal temperature.*—The patients must be comfortably warm, especially the feet, in a moderately-heated room. The temperature must be normal. To obtain reliable mouth temperatures, the thermometer is left in the mouth for six minutes. Du Bois has shown that an elevation of temperature of 1° C. will increase the metabolic rate by 10 per cent.

Under the above conditions, the body is run idle as it were, and the rate recorded is that almost as low as during sleep. *The potential energy which is being employed to provide heat is in the body tissues.*

EXPRESSING RESULTS

They are usually expressed as " plus " or " minus," a figure, e.g. plus 40 or minus 25. These figures are arrived at in the following way :—

If the oxygen consumption of an individual has been estimated as 288 c.cm. per minute, then if the R.Q. is ·82 this amount of oxygen would realize 1·39 calories of heat per minute, or 83·4 calories per hour. The next step is to compare this figure with a normal standard. It is now generally recognized that, even if the heat production is primarily dependent upon an unknown factor, it is proportional to the surface area of the body. In other words, a large body will give off more heat than a small one. If the human body were an exact cube, the determination of the surface area would be a simple matter—i.e. six times the area of one side. Many attempts have been made to determine the surface area of the human body by the application of sticky paper all over the body and afterwards placing the separate pieces together. Delafield Du Bois and Eugene Du Bois improved upon this technique by the use of paraffin moulds, and they measured with great accuracy the surface area. To overcome this somewhat laborious procedure they devised a complicated formula by means of which the surface area could be calculated from the height and weight. Their formula was :—

$$\text{Surface Area (square metres)} = (\text{Weight in kilograms})^{0\cdot425} \times (\text{Height in centimetres})^{0\cdot725} \times 71\cdot84.$$

These workers constructed tables with various heights and weights so that the surface area could be read off at once after the height and weight had been determined. For such tables special monographs must be consulted.

Two other factors are of great importance regarding heat output, and these are : (*a*) age ; and (*b*) sex.

By a study of a large series of normal people Aub and Du Bois have been able to determine how these factors affect the heat output and their observations can most conveniently be presented in the form of a table.

TABLE 3.

Heat Output in Calories per Square Metre of Body Surface per Hour.

Age (Years)	*Males.*	*Females.*
14–15	46·0	43·0
16–17	43·0	40·0
18–19	41·0	38·0
20–29	39·5	37·0
30–39	39·5	36·5
40–49	38·5	36·0
50–59	37·5	35·0
60–69	36·5	34·0
70–80	35·5	33·0

It should not be assumed that Du Bois pretended that a sharp demarcation existed between different age-groups, for in his original paper a smooth curve was produced. The results are reproduced here in tabular form for the sake of brevity.

We have now all the details necessary for the working out of a B.M.R.

Example.

Name : A.B. Sex : Female. Height : 59½ inches. Weight : 87½ lb. Age : 30.

Body surface area (from a special table) = 1·29 square metres.

Factor for age and sex = 36·5 calories per hour.

Therefore the total heat output per hour of a normal person of this age, sex, height and weight = 1·29 × 36·5 = 47·1 calories.

This patient's oxygen consumption was found by experiment to be 288 c.cm. per minute.

(At R.Q. of ·82 1,000 c.cm. of oxygen is equivalent to 4·825 calories.)

In terms of calories of heat therefore, 288 c.cm. of oxygen per *minute* = 83·4 calories per *hour*.

Normal heat output = 47·1.

Calculated heat output = 83·4.

This patient is increased by 36·3 calories per hour or

$$\frac{36\cdot 3}{47\cdot 1} \times 100 = 77 \text{ per cent.}$$

The B.M.R. is thus reported as plus 77.

THE RANGE OF NORMAL METABOLISM

By most authorities the range of normal basal metabolism is from plus 10 to minus 10, although it must be understood that a small percentage of normal individuals will have B.M.Rs. outside this range. Although the range of normality is given as plus 10 to minus 10 it does not mean that an individual's B.M.R. varies within these limits, indeed the B.M.R. of an individual is remarkably constant in the same way as temperature, pulse rate and blood pressure do not present great variations. The author's own B.M.R. has not varied over the last few years. In March, 1931, it was minus 9, and a few weeks ago it was minus 10.

VARIATIONS IN THE B.M.R. IN UNTREATED CONDITIONS

The basal metabolic rate is *increased* in the following conditions :—

1. Thyrotoxicosis.—This condition includes toxic goitre, exophthalmic goitre, toxic adenoma, Graves's disease, hyperthyroidism.
2. Leukæmias.—This is caused by the increased nitrogen catabolism.
3. Polycythæmia.—Probably due to increased volume with increased work of the organs.
4. Small percentage of hyperpituitarism in the active stage.
5. Heart failure.—This is found only when dyspnœa is present, and the increase is due to overwork of the respiratory muscles.
6. Fever.
7. Pregnancy in the last few weeks.

It is *decreased* in the following conditions :—

1. Hypothyroidism.—This includes myxœdema and cretinism.
2. Under-nutrition.—Such as is found in anorexia nervosa, and

severe diabetes.
3. Nephritis with œdema.

It is *normal* in the following conditions :—

1. Obesity.
2. Simple goitre.
3. Hypertension and hypotension.
4. Heart disease without failure.
5. Nephritis without œdema.

VARIATIONS IN THE B.M.R. AFTER ADMINISTRATION OF DRUGS OR EXTRACTS

Substances which lower the B.M.R.—(1) Iodine and all its compounds can lower a *raised* B.M.R. This action is studied fully in the next section. (2) Sodium and ammonium fluoride by mouth or intravenously are believed to have a similar action to iodine, but little evidence as yet is present to support this view. (3) Morphine produces a slight decrease.

Substances which raise the B.M.R.—(1) Thyroid gland by mouth. (2) Thyroxine (the active principle of thyroid) intravenously. (3) 3 : 5 diiodothyronine. (4) Certain nitrophenols. Certain drugs, such as caffein and adrenaline stimulate metabolism, but they have no effect on the *basal* metabolism, i.e. their action is not apparent fourteen hours afterwards.

Thyroid, thyroxine and 3 : 5 diiodothyronine have been used very successfully in the treatment of hypothyroidism, the patient returning almost to normal appearance and mentality. During treatment, one of the main features noted was loss of weight, and it was this action of thyroid upon the obesity of hypothyroidism that has led to its indiscriminate use in the treatment of other forms of obesity. The employment of thyroid and other metabolic stimulants in raising the metabolism of people with a normal metabolism is undesirable.

THE B.M.R. IN THYROTOXICOSIS

The B.M.R. is always raised in thyrotoxicosis, and the more severe the toxicity, then the higher the B.M.R. Two means are available for exerting a control over the raised basal metabolism of this disease, and these are rest and iodine. It must be emphasized that the author is not discussing the treatment of thyrotoxicosis, but merely certain facts which can alter the raised metabolism.

Rest.—Rest can produce a fall of from 10 per cent. to 15 per cent., but it never causes a raised metabolism to become normal.

Iodine.—Iodine has a specific action upon the raised metabolism of thyrotoxicosis. Although the administration of iodine in the treatment of hyperthyroidism has been limited almost entirely to the use of Lugol's solution, the formula of which is iodine 5 per cent., potassium iodide 7·5 per cent., nevertheless any compound of iodine is effective. Thus potassium iodide, hydriodic acid, organic compounds such as sajodin, ethyl iodide by inhalation, and application of iodine to the skin all produce as much fall in the metabolic rate of thyrotoxicosis as adequate doses of Lugol's iodine. It would follow, therefore, that iodine produces its specific action irrespective of route or type of compound.

The story has now become a classic how Trousseau first accidentally discovered the therapeutic action of iodine in Graves's disease. In 1863, Trousseau was called to see a young married lady suffering from exophthalmic goitre with a pulse of 140 to 150. At that time it was considered dangerous to give iodine to goitre, and Trousseau, preoccupied with the idea that iodine was dangerous, wrote it instead of digitalis. The patient took 15–20 drops of iodine per day, and when she returned in a fortnight her pulse had fallen to 90 and she felt markedly improved. It is to Plummer, however, that the real credit is due, for the present-day successful surgical treatment of thyrotoxicosis. Plummer noted that iodine caused the B.M.R. in thyrotoxicosis to fall almost to normal in ten to fourteen days, and that during this artificial remission in the disease, it was safe to operate.

The specific action of iodine in thyrotoxicosis.—The administration of iodine has no effect on the B.M.R. of a normal person, but its immediate action in the presence of thyrotoxicosis is : (1) a fall in B.M.R.—the commonest reaction; or (2) a rise in B.M.R.—a rare reaction. Iodine is never therefore without effect, and this fact provides a useful diagnostic test.

The action of iodine on the B.M.R. of an untreated case of Graves's disease may be summarized thus :—

1. It causes the B.M.R. to fall, the action beginning within twenty-four hours and reaching its maximum in ten to twenty-four days.
2. If iodine is suddenly stopped, no matter at what period, the B.M.R. begins to rise in from twenty-four hours to three weeks later.
3. Even if iodine is continued medicinally its action in controlling the B.M.R. wears off. Why iodine should lose its action is by no means clear. Fortunately it is possible to overcome this loss of action of iodine by completely stopping it for 4–6 weeks. At the end of this time the patient will be able to respond again.

Thyrotoxicosis and a B.M.R. within normal limits.—Recently opinions have been expressed in describing certain types of thyrotoxicosis, that this disease can exist without a raised B.M.R. I am of the opinion that if thyrotoxicosis is present then the B.M.R. *must be raised.* Misinterpretation of the metabolism findings have arisen in the following ways : In the first place, the B.M.R. results are frequently examined without any thought as to whether iodine or its compounds have been taken during the previous weeks. It is well known that iodine can reduce the B.M.R. Secondly, there are undoubtedly cases of untreated Graves's disease in which the B.M.R. is not outside average normal limits, *but that is not the same as saying that it is not raised.* The B.M.R. *is* raised above that particular patient's normal. The following example is of such a case :—

Miss A.B., æt. 27.—Initial B.M.R. untreated minus 2; B.M.R. after ten days' iodine minus 15; B.M.R. after subtotal thyroidectomy minus 14.

In this case the initial B.M.R. was within normal limits, but iodine caused a fall to minus 15. In other words, this patient's normal B.M.R. was minus 15, and a B.M.R. of minus 2 meant a raised metabolism.

Undoubtedly the strongest argument in favour of hyperthyroidism occurring with a normal B.M.R. is that thyroidectomy in these cases relieved the heart failure. Fairly recently, however, Blumgart and Levine have clarified this position by showing that thyroidectomy—not necessarily complete—will alleviate, even cure, any type of heart failure by producing a degree of myxœdema.

SUMMARY OF THE VALUE OF THE B.M.R.

(1) The B.M.R. provides a specific means not only of determining the presence of Graves's disease, but in assessing its toxicity.

(2) The difficulties in the diagnosis of the border-line cases can be overcome by making use of the B.M.R. before and after iodine.

(3) If the intensity of the thyrotoxicosis is required, then for six weeks before the B.M.R. no iodine should be taken.

(4) It is of value in the diagnosis of hypothyroidism, and provides a means of checking treatment with thyroid.

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THE NEUROLOGICAL TRAINING OF THE MEDICAL STUDENT

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EVERY practitioner of medicine, whether he be a family doctor or has adopted one of the many specialties, should during his undergraduate course acquire some knowledge of the organic diseases of the nervous system and of the neuroses and the art of medicine, if he is to practise his profession with the maximum of efficiency. What can be done to utilize the undergraduate's time to best advantage in order that he may receive the type of training in neurology which will be most useful to him in after life? What should he be taught? How should he be taught? And who should teach him?

The student of medicine who is about to begin the study of clinical medicine enters the hospital with a mental outlook determined by the pre-clinical sciences which have up to this time occupied his thoughts. It is instructive to speculate as to some of his preconceived ideas. Possibly he may be under the impression that a sound knowledge of anatomy, physiology and pathology is in itself all that is necessary to make a good clinician. If this is so he is mistaken. He must now acquire the clinical attitude of mind, the outlook of the naturalist, an independent observer who is constantly asking himself the question why, and drawing his inferences and conclusions from the facts observed. He must learn to value his knowledge of the pre-clinical sciences according to the basal information they provide in relation to the study of men in health and disease. "The purpose of education," wrote John

Buchan, "is to train the mind and not to crowd the memory." It is difficult for the undergraduate to realize the truth of these words, for he is so much occupied with memorizing a mass of facts that he has but little time for independent thought although his teachers may do much to instil in him its value. Impressed with the complexity of the anatomy of the nervous system and with the intricacies of its physiology, the tyro probably regards the diagnosis of nervous diseases as he would a jig-saw puzzle and localization of disease in the nervous system as a high-class academic exercise which is occasionally of direct practical use in enabling the clinician to locate a tumour in the brain. Experience will teach him that localization is of the greatest value because of the indirect information it affords as to the nature of pathological processes. For "nerves" the tyro has probably but little use and on graduating he has seldom any conception of the important place the neuroses will occupy when he comes to practise his profession. After teaching both clinical medicine and neurology for many years in a great medical school, the aim of which is to produce the best type of general practitioner, I venture to make some observations upon the undergraduate's training in neurology which are, I think, worthy of consideration.

REQUIREMENTS OF THE STUDENT

The first concern of the teacher of undergraduates must be the requirements of those for whom he is responsible. To arouse the enthusiasm of his students is the ambition of every teacher, but the teacher must remember that the student is, so to speak, at his mercy and that he, the teacher, has to create the perspective. Consequently he must resist the temptation to over-emphasize his personal interests. The extent of knowledge is such that while facts are essential, discrimination is called for in their selection. Special attention should be paid to principles and methods. The aim of the teacher should be to provide the student with a sound and attractive structure, an efficient working basis, to which the facts will appropriately adhere as they present themselves.

What then are the neurological requirements which may be reasonably expected of the man in general practice. Clearly it is desirable that he should be familiar with the commoner diseases and disorders with which he meets and have some knowledge of rarer conditions in which correct diagnosis, prognosis or treatment are matters of vital moment. He should know how to set about the examination of a case of organic disease and how to elicit the facts; he should be conversant with the mental factor in disease, what to say and what not to say, and how to deal with the minor neuroses.

ORGANIC DISEASES

Let us consider, in the first place, the undergraduate training in the organic diseases of the nervous system. The student may acquire his knowledge in various ways and from numerous sources, but I wish here to allude especially to the lecture demonstration, a method of teaching which is, I think, of the greatest value. The organic diseases of the nervous system lend themselves to this type of teaching, for it is possible to demonstrate cases in a clinical theatre to a large body of students. The method I would advocate is as follows :—

Two or three introductory lectures are devoted to a brief sketch of the applied anatomy, physiology and pathology of the nervous system. The commoner organic nervous diseases are then dealt with more or less systematically in the following way. A patient is brought into the auditorium, the attention of the student who it is assumed has had no previous clinical experience is drawn to any morbid appearances he may present and the significance of each is discussed in turn in the light of the anatomical and physiological knowledge the student may be presumed to possess. When all the obvious justifiable inferences have been referred to, the patient is physically examined with special reference to the observations already made and the facts epitomized in relation to the anatomical diagnosis. The history is then briefly elicited from the patient and inferences as to the nature of the pathological process discussed in the light of the information so obtained. Finally, the lecturer attempts to summarize vividly all the facts and advance a reasoned anatomical and pathological diagnosis to account for them. Then and only then is mention made of the name by which the disease is to be classified. Attention is then drawn to any exceptional features the case may present, brief reference is made to etiological, prognostic and therapeutic considerations, and the student is referred to his textbook for a systematic description of the disease.

From day to day different disorders are treated in this manner, the lecturer pausing from time to time as appears opportune to discuss the precise general significance of individual symptoms and physical signs. Towards the latter part of the course the rapid routine examination is repeatedly carried out and problems of differential diagnosis referred to with direct reference to the individual case. The advantages advocated for this method of teaching, which is in my opinion much more instructive than the systematic lecture, are (1) that the neurologist has thereby an opportunity of instructing all the students of the year, and (2) that the student learns how the physician observes and thinks; he has repeated opportunities of noting the precise method employed by the physician in eliciting the phenomena of disease, and of learning something of the exact significance of symptoms and physical signs; he sees types of many of the commoner disorders which he will probably meet with in practice; he learns to think of disease in clinical terms and not according to textbook descriptions; in other words, he acquires the clinical outlook and learns how to approach a case, while in addition he sees the way in which the physician deals with patients and always keeps in view the patient's attitude of mind. Pathological and anatomical demonstrations, directly related as far as possible to the clinical demonstrations, constitute a popular feature of a course of this kind.

A course of clinical lecture-demonstrations, such as this, is of the greatest value in giving the student a general conception of, and interest in, the organic diseases of the nervous system. It provides a most useful introduction and an incentive to his ward work which, needless to say, it cannot replace, for it is only by personal contact with individual cases that the student can gain the familiarity with disease which is the requisite of the clinician. Special neurological departments have now been instituted in some of the teaching hospitals. While these are useful for post-graduate study, my personal feeling is that both from the educational and administrative standpoints it is desirable that the undergraduate should receive his general neurological instruction, cliniques and case recording, in the general wards of the hospital. A special department must of necessity create the impression that neurology is a distinct specialty, and when such a department exists, the general physician is inclined to refrain from referring to the neurological side of disease and leave it to his neurological colleague. Many of the so-called organic nervous diseases—the vascular accidents and subacute combined degeneration for instance—arise as complications of, or in association with, diseases admitted to the general wards; while, further, neurological diseases may present symptoms which simulate general diseases or local disease in various parts of the body. In tabes dorsalis we have a notable example. Thus lightning pains, gastric or laryngeal crises, optic atrophy, bladder disturbance, an arthropathy, a trophic ulcer, or a spontaneous fracture may all occur as the earliest manifestation of tabes. Hence these cases may be admitted directly to a general ward or sent to one of the special departments of the hospital.

Attendance at a neurological out-patient department is, too, most useful to the undergraduate, for here he learns the methods of approach in diagnosis which are required of him in practice.

THE NEUROSES

I would now direct your attention to the undergraduate's training in the neuroses. The minor neuroses are among the most common disorders with which the practitioner is called upon to deal and, further, in many cases of physical illness the question arises to what extent is an associated or superimposed mental factor responsible for the clinical picture? Unlike the organic diseases, the neuroses cannot be regarded as dangerous illnesses in so far as life is concerned, for the physical health of the subject of a neurosis is often unimpaired. This is no doubt the reason why the practitioner often shows an unfortunate lack of interest in these cases, despite the distress and disability to which they may give rise. It is the general practitioner who comes across the minor neuroses and if he has had the necessary training and realizes the possibilities he can do much both in the way of prevention and cure. Who then is to teach him? T. A. Ross discussed "The Teaching of the Neuroses to Medical Students" in his Morison Lectures which were delivered in June and will appear in forthcoming numbers of the *Edinburgh Medical Journal.* His remarks are well worthy of our perusal. Ross is of opinion that neither the psycho-analyst nor the psychiatrist nor the neurologist but the general hospital physician and surgeon should be responsible for the student's training in the neuroses. Thus he writes, "If we can get the neuroses and psychotherapy put under the aegis of general and special physicians and surgeons, and can get them to see what interest they have, we shall soon have a race of doctors capable of dealing with the common neuroses; and it is the common curable things that we ought to pay attention to." With these remarks I emphatically agree, but

Ross is an idealist and he makes no suggestion as to who is to arouse the interest and be responsible for the teaching of " the general and special physicians and surgeons ". I agree with him that the medical student should not be encouraged to dabble in the speculations of the psycho-analyst but that he should confine himself to the psychology of the conscious mind, and that the psycho-analyst is not the individual to instruct him in the neuroses. And what of the psychiatrist? Within recent years the psychiatrist has sallied forth from behind the walls of his institutions and staked out a claim in the treatment of the neuroses. It is of interest to trace the origin of these raids. A stigma has from the earliest times been attached by the public to mental disease, an unfortunate impression which the psychiatrist is rightly anxious to correct. With this object in view he no longer calls his institutions asylums but mental hospitals or hospitals for nervous and mental diseases. He has also established out-patient clinics to which he would attract patients suffering from neuroses. Again, he points out that he has especially devoted himself to the study of the mind in health and disease, that a diagnosis between a psychosis and a neurosis in the early stages may be difficult, that the early treatment of the psychoses is of great importance in prevention, and that he is the expert here both in diagnosis and treatment. The psychiatrist was not slow to seize his opportunity when the neurologist began to use the word " mental " with which to designate the origin of the symptomatology of the neuroses. But while one has every sympathy with the psychiatrist in his ideal, he has no easy task before him if he is to establish his position as the authority on the neuroses to whom the training of the undergraduate should be entrusted. The stigma attached to mental disease is of such long standing that it will be with difficulty dispelled. Further, while the psychiatrist claims that he has applied himself particularly to the study of academic psychology and mental symptomatology, he does not come across the neuroses in their early stages and possibly never will have this opportunity. "Historically," writes Ross, "it has been the neurologists in this country and elsewhere who have taken most interest in and done most to advance our knowledge of the neuroses and of their treatment by psychotherapy. . . . In this country too, it has been chiefly the neurologists who have been most active with these patients. And yet," he adds, "I should be very sorry if the neuroses were again to be regarded as a subsection of neurology." Further, he writes, "If, as seems inevitable, the neuroses come into every department of medicine, then it is true that they do not belong specially to neurology even though they are nervous, nor to psychiatry even though they are mental, nor to psycho-analysis even though they may have unconscious factors." Again I agree, but, as I have said, Ross leaves the whole matter in the air, for while he holds that the student should acquire his knowledge from the general or special hospital physician or surgeon, he admits that the interests of the latter will have to be aroused and he makes no suggestion as to who is to do it.

In my opinion a course of half a dozen to a dozen lectures delivered to the undergraduates *by a neurologist* who is interested in the neuroses and the personal side of medicine, illustrated by graphic references to cases from his experience, is at the present time at least the best solution of the problem. The undergraduate will remember all his life the lessons with which he has been impressed by an enthusiastic teacher and if in later life he in turn becomes a teacher, whether he be a general physician or surgeon or a specialist, he will pass on the lessons he has learned to the coming generation.

ON SOME MINOR DIGESTIVE ERRORS

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APART from the large group of serious diseases of the alimentary tract lesser derangements of digestive function are of frequent occurrence. They are characterized by their slight nature, their brief duration, and by the absence of any gross pathological changes. Some alteration of structure, secretion, motility, or absorption may be assumed to exist and to be of a degree consistent with the symptoms, but physical signs are absent. Thus the disturbance of a minor digestive error can be properly classified as functional. To obtain a return of the function to normal symptomatic treatment should suffice; but it is unlikely to be effective without recognition of the probable cause of the discomfort. Correct observation in short of both cause and effect is necessary for accurate attention.

ACIDITY

When patients complain of acidity they mean either a hot uncomfortable feeling in the midriff often described as " burning," or the regurgitation of a sour acid fluid to the back of the throat. Both sensations are often combined. If the uncomfortable feeling is more on the left side, it will be described as " heartburn." Associated with it may be that consciousness of an increased heart-action (increased in force and in rate) known as " palpitations." The occurrence of the symptom is usually timed as shortly after food, perhaps half an hour. Such a condition depends on a relative excess of gastric secretion. There may be an actual increase of secretion; there may be undue retention of a normal secretion; or there may be insufficient regurgitation of the alkaline duodenal contents into the stomach. The actual pathological detail is not relevant as the situation is fundamentally the same.

Food may be indigestible in virtue of its own nature, e.g. the hard, fibrous vegetables, such as nuts or radishes; stringy ones, such as French beans or rhubarb; pips or skins as in apples or tomatoes; old tough meat; the coarser meats such as pork or steak; cereals with an excess of roughage, as in the bran foods. Or, and much more often, it is indigestible because it is insufficiently chewed. The habit of bolting food, of hurried, hasty, disturbed meals, it has become a truism to condemn. Chewing may, however, apart from carelessness, be made more of an effort by false teeth, the efficiency of which is only a fraction of the natural. Thus the entry of a bolus of food, ill-prepared or unsuitable, into the stomach demands greater motor and secretory activity. It will act as an irritant.

The same principle holds with condiments which are intended to stimulate and may easily overdo this effect. These are deleted at once from most dietary sheets. One, however, frequently escapes notice because it is often unsuspected, namely, salt. An excessive intake of salt influences the acid-alkali balance and encourages secretion of hydrochloric acid as an excretion. Many people take a ridiculous amount. It is a safe rule in indigestion of any kind to forbid salt on the plate; quite enough is used in ordinary cooking.

Lastly, alcohol and tobacco must be considered. A light wine or a plain whisky and soda with food is harmless; neat spirit on an empty stomach is abuse. Save in the presence of an organic lesion it does not seem to make any material difference.

Nervous, or more properly emotional, causes are at the foot of many forms of passing digestive discomfort, not only acidity. There is a close relationship between emotional tone and digestion; just as emotions are pictured in facial expression so they definitely influence the intestinal state. The proof of this statement does not rely on psychological opinion but on plain physical experiment, as in Cannon's classical work. Its application to practice is obvious. A common form in which emotional stress is expressed is an overactive or spastic pylorus. The acidity produced by this cause is often overlooked, but a little judicious questioning will soon bring out a relationship of the digestive discomfort and mental irritation. It needs no expert knowledge to detect anxiety, worry, distress or what is popularly termed "nervousness"; a relation of the nervous state and the digestive complaint should be at once accepted, nor need the existence of other contributory errors preclude treatment of the patient as well as of his symptom.

Treatment.—The first step in the treatment of acidity, as already remarked, is detection and removal of the probable cause. Should doubt be reasonable, as may occasionally be the case, there is no objection against eliminating all appreciable chances of error. An alkaline preparation should be prescribed after food. In this connection it should be recalled that bicarbonate of sodium, the popular form, has certain chemical disadvantages, from which the earthy carbonates, magnesia, calcium and bismuth are free. A combination of them all as in Maclean's admirable formula, is now available as the Pulv. bismuth. co. B.P.C. It is made up as follows :—

℞	Sod. bicarb. - - - - - - -	1 part
	Bismuth. carb. - - - - - -	1 part
	Calc. carb. - - - - - - -	3 parts
	Magn. carb. pond. - - - - - -	3 parts

Dose one to two teaspoonfuls.

It can often be varied with advantage by transposing the magnesia and the bismuth. Another favourite prescription is an alkali with belladonna, viz. :—

℞	Liq. bismuth.	30 minims
	Sod. bicarb. -	20 grains
	Tr. bellad. -	5 to 10 minims
	Aq. chlorof. ad	½ ounce.

℞	Tr. bellad. -	10 minims
	Mist. cret. ad	½ ounce

Convenient tablet preparations are citralka, a pleasing effervescent combination of citrates; alocol, which is a hydroxide of aluminium; or the old-fashioned and most useful soda-mints.

There are two other drugs, not nowadays so often employed, both of which have a mild soothing effect on the irritable gastric membrane: hydrocyanic acid (ac. hydrocyan. dil., 1 to 2 minims) does not act as an acid and can be added in spite of the apparent inelegance to an alkaline mixture. It has a distinct sedative effect. The anæsthetic quality of carbolic acid is available in the form of glyc. ac. carbol. (5 to 10 minims) and well merits employment in suitable cases.

TASTE DISTURBANCE

A *nasty taste* in the mouth, with or without other symptoms, is often complained of. One of the most significant points of inquiry in anamnesis is contained in the single word "when." The questions, when is the symptom noticed? when does it bother the patient? and so on, at once direct attention to preceeding events and raise possible or probable associations. The nasty taste in the mouth on waking is quite different from the nasty taste coming a little after waking, or coming soon after a meal. Which does the patient suffer from, or to be exact *when* does he get the symptom? The mouth-breather always wakes up in the morning with a dirty tongue and a nasty taste; it is useless to seek further for a cause or waste effort on treatment. A little later in timing is a return of watery fluid to the mouth—not sour or burning or acid—simply watery; this is water-brash, i.e. fluid from the œsophagus, and should arouse a suspicion of alcoholism in which it is perhaps most commonly seen. A nasty taste occurring after food will be the regurgitation of hot, sour, and unpleasant, partly digested stomach contents, i.e. acidity. Dental caries, septic tonsils, local septic conditions of the mouth and naso-pharynx in general seldom give rise to a nasty taste.

BILIOUSNESS

•Biliousness is a popular diagnosis and like all the current nomenclature of the man in the street, has a certain aptness, as it suggests an excess of bile in the system. The patient has a lack-lustre expression, a sallow skin, stained conjuctivæ, and a dirty tongue; he complains of malaise, a nasty taste, nausea, anorexia and constipation. There are no particular physical signs. Several misconceptions are widely held as to the cause of biliousness. From the appearance and the complaints which suggest a mild degree of obstruction to the free flow of bile with or without alteration of its quantity and quality, the view has arisen that it is a catarrh of the bile-ducts. Similarly the associated constipation has received the blame of being the causative error. The condition is really a mild hepatitis. Any interference with biliary secretion is partly mechanical and partly reflex, the latter cause also accounting for the constipation, which in itself does not arouse inconvenience of a " bilious " type. The liver is the most important gland in the body with a complicated and imperfectly understood group of functions. The portal blood loaded with the products, good or bad, of digestion is carefully filtered through the liver; its threshold of capacity to cope with improper constituents is high; its reaction to excess of irritation, as by alcohol, appears as a mild congestion, i.e. an early inflammatory state.

These cases exhibit three elementary errors of habit, which it is to be admitted receive general recognition. First, insufficient exercise, which encourages capillary stagnation; secondly, over-eating. I do not think it matters so much what is eaten as how much, but the excessive intake of meat in any form is probably the most common form. This places on the liver a constant effort to remove or to nullify breakdown products, the result of a situation where supply and demand are out of balance. Most middle-aged people indulge in a total daily intake grossly out of proporion to their physical needs. Quarter of a pound of meat—an ordinary restaurant helping—is sufficient daily portion for any adult. In calories (total diet) fifteen or sixteen hundred are adequate for the ordinary woman, and for the man about twenty-two hundred. Simple dietaries giving the above are found in many handbooks and need not be detailed. But it is convenient to remember that the common error is an excess of meat and a deficiency in greens, vegetables, salads, and fruits. Thirdly, the fluid intake is seldom right. Few people drink enough water.

Some types appear constitutionally predisposed to this complaint, the thick, heavily-built, burly, red-faced man on the one hand, and the thin, sallow, gloomy individual. It is possible that just as there are variations within the range of normal in gastric secretion, so there are variations in hepatic capacity.

Treatment should start by starvation. Oranges alone for a day or so, followed by milk or milky slops give the digestive mechanism a much-needed rest and allow the natural resources of the body to correct the condition. Calomel and salts are time-honoured remedies, having the dual benefits of a good purge and a specific effect on the liver. If constipation was the essential factor an enema should theoretically suffice, but it certainly does not. They should be followed by one of the old-fashioned rhubarb and soda mixture, as in one of the following :—

℞	Sod. bicarb.-	20 grains
	Tr. nuc. vom.	10 minims
	Tr. rhei. co.-	20 to 30 minims
	Inf. gent. co.	ad ½ ounce

℞	Sod. bicarb.	20 grains
	Tr. bellad. -	7 minims
	Liq. hydrarg. perchlor.	30 minims
	Tr. rhei. co.	10–20 minims
	Aq. cinnam.	ad ½ ounce

A practical method of attack can be found in continuing the calomel in minute doses (grains 1/10 to 1/6) every night for ten days or a fortnight. It is not necessary to follow such a small dose by saline, though an adjuvant effect is obtained thereby preferably in the form of one of the effervescent preparations. Another estimable prescription is the green iodide of mercury (hydr. iodid. virid. grain 1/32 to 1/16) given in pill form, t.d.s.

FLATULENCE

Flatulence is the term applied to an excess of gas in the abdomen and is a symptom present or complained of in almost every digestive disorder. The discomfort of paroxysmal attacks of "wind" is a common complaint. Such cases, i.e. those without indications of a clear-cut underlying cause, fall into two distinguishable forms, flatulence in the stomach and flatulence in the intestines, by which is meant the colon.

There are several varieties of the former. First, that associated with a systemic organic disease, not strictly involving the digestive tract, e.g. cerebral, cardiac, nephritic or arterial. All cases of angina, for instance, suffer badly from flatulence.

Secondly, the group related to posture, of which there are two distinct types. The patients who require to take most of their meals in bed, increased, no doubt, by a general reduction of intestinal efficiency, are apt to have a tendency to flatulence. But there is another and commoner form of faulty posture, namely, that ordinarily assumed at table. Many people sit badly; they slouch forward, relaxing the abdominal muscles, and hunching the back. A maladjustment of a purely mechanical type is thus set up, as can be readily tested.

When the complaint of flatulence is notably associated with eructations, the patient is likely to be an air-swallower. This is a pure neurosis. Starting as a bad habit, a slight mechanical swallowing from nervousness, it rapidly passes into an unconscious routine and assumes distressing proportions. It may very readily be diagnosed by asking the patient in a matter-of-fact sort of way to belch. Only the air-swallower can do so to order, and he will never fail; he gulps away, he adopts strange attitudes, and goes through what is obviously a habitual ritual ending in the noisy expulsion of a large quantity of swallowed air.

Emotional states in nervous individuals apart from air-swallowing often result in a sensation of distension described by the patient as " gas." But the symptom alone will be recorded, not the emotional state operative in production ; this must be sought for. It should be suspected in every patient who makes the complaint of flatulence with irregular and unusual timing, e.g. " gets gas as soon as it gets dark, which makes her feel so irritable " ; " always has flatulence after dinner unless he goes to the pictures." The observation of an uncertain relation to everything except an emotional state is the key.

Treatment again will vary with the cause. The systemic group where the depression of gastric function is only part of the general impairment of vitality will be helped by a mild acid and pepsin mixture after meals, or by a bitter aromatic before meals, such as the following :—

℞	Sod. bicarb.	-	10 grains	℞	Tr. nuc. vom.	-	10 minims
	Tr. nuc. vom.	-	10 minims		Tr. gelsem.	-	10 minims
	Tr. cinchon. co.	-	30 minims		Tr. bellad.	-	6 minims
	Inf. calumb.	ad	½ ounce.		Inf. gentian. co.	ad	½ ounce

The whole purpose is to encourage and stimulate the stomach. The use of condiments, dainty, appetizing and *small* meals, with a judicious allowance of alcohol, such as bitter beer or whisky are helpful concomitants. The essential oils as a symptomatic measure will be found of value. But the pharmacopœial dose should be ignored. Five drops of oil of peppermint, cloves, or cinnamon according to taste, in a teaspoonful of water, every hour if necessary will be a welcome carminative and does in truth secure a measure of comfort. Another old-fashioned remedy is a small lump of sugar soaked in brandy. These oils may of course be added to a prescription but their provision alone for symptomatic use is generally wiser.

The other types of bad habit only require reasonable instruction. But the air-swallower is indeed a problem. As the condition is the symptom of an underlying nervous instability, treatment of the complaint meets with the success such faulty therapeutics deserve. It is best to explain quite frankly how the trouble is brought about; it is easy to demonstrate to the unfortunate sufferer that he is doing it himself, and that it is intimately related to his emotional imbalance. It is only thereby that confidence can be established and any degree of result obtained. Having been educated to appreciate the emotional significance of the symptom, he should be warned never in any circumstances to eructate or even to try to do so. He must learn to keep a careful guard on himself which he can only do when he understands that the flatulence is the result of repeated gulps of air going down until the accumulated bubble is loudly expelled. The strictest detail must be followed in explanation until conviction of the nervous element is established. Should suggestion be available it is of value as in the treatment of any single neurotic symptom. The approach indicated, persuasive and encouraging, entails a suitable degree of unconscious suggestion. It is helpful to prescribe in addition a simple bitter bromide mixture before meals, such as :—

℞	Sod. bromid.	5 to 10 grains
	Sod. bicarb.	10 grains
	Tr. gelsem.	5 minims
	Inf. quass. ad	½ ounce

For this or for any other nervous type of minor digestive error, small doses of luminal, conveniently written as sod. phenobarb. (grain ¼) and preferably given before food are useful. Another less known but valuable sedative is veronal. It should for obvious reasons be prescribed as sod. malurea, grain 1 three or four times a day; this small dose sounds ridiculous but will be found in practice quite effective. It is free from the defects of bromide or luminal and is a useful addition to the armament of medication in the nervous case. Should bromide be preferred one of the proprietary forms may with advantage be given, such as bromural

(5-grain tablets) or the tabl. trip. brom. effervesc. (grains 10). Elix. valibrom B.D.H. (30 to 60 minims) and elix. lumin. (Bayer) (30 to 60 minims) are convenient and pleasant preparations.

Flatulence, passing downwards, comes from the large bowel. If in the transverse colon it may easily give the misleading impression of being gastric. The patient complains of expelling much gas, perhaps of explosive motions, and probably on questioning will agree that the excess is more obvious in the morning. The reason for this is the accumulation in the descending colon and the sigmoid flexure during the night becoming noticeable on waking or getting up.

The common cause of the flatulence is a fermentation of the carbohydrates or starches, the stools being acid, frothy and exhibiting an excess of undigested starch. It will be recalled that starch is not taken only as sugar, bread, potatoes, puddings and the like, but is also an important constituent of the vegetables and fruits. In the latter, however, the starch granules are enclosed in envelopes of cellulose which requires breaking up or separation to a greater or less degree. Hence comes the popular and certainly not erroneous concept of cabbage and the like as " windy stuff."

It will be evident that a faulty starch digestion may arise on the one hand from an excess, relative or actual, of intake over the capacity of the available pancreatic secretion and on the other hand from a simple mechanical difficulty of access. Other factors such as the nature of the intestinal flora and the rate of flow through the small and large intestines, are frequently involved, but need not here be considered.

The practical features of the case are two-fold, the fondness of many individuals for sugars (a " sweet tooth ") and starches generally, and secondly the emphasis which of recent years has been placed on the advantages of a roughage diet, i.e. rich in fresh fruit and vegetables. The diet should be reviewed. Bread should be restricted to one small piece per meal, sugar drastically restricted, and vegetables reduced to extracts as in soups, or allowed only in the simpler forms as a purée or run through a mincer. It is always wise to eliminate the coarse vegetables altogether. It may be further considered wise to prescribe takadiastase, in the form of tablets (5 grains, t.d.s., p.c.) or as the elixir takadiast. B.P.C. (30 to 60 minims) or elix. takadiast. sedativ. which contains adjuvant sedatives. But the same effect can usually be obtained by giving yeast, in one of the convenient proprietary preparations. Vitamins A and B have a specific influence on intestinal function and motility and are of value in such cases as those under discussion. Or one of the soured milk preparations, such as yoghourt, a thick cream-like preparation of *B. bulgaricus*, which alters the intestinal flora in a beneficial direction, will be found distinctly helpful.

FULNESS AFTER MEALS

A sense of weight or fulness after meals does not need further definition. The complaint is usually of an intermittent or occasional discomfort, and questioning will elicit that it tends to follow only a heavy meal. The sense of repletion after a heavy dinner is familiar; such a sensation somewhat exaggerated gives this heaviness or fulness. It indicates that the motor and secretory activities of the stomach are not adequate to their purpose. Hypotonia and hypochlorhydria often go together.

The existence of a proportion of the population, statistically about 10 per cent., constitutionally lacking in acid-production is common knowledge, but it is insufficiently recognized how little discomfort such a shortage may cause. It is amazing how little acid may be secreted with no, or only negligible, symptoms. It is equally insufficiently recognized that the normal acid production of the healthy adult tends to diminish with age, consonant possibly with a general decline in physical vigour, but more probably the simple accentuation of a constitutional tendency. Such patients are not infrequently encountered. Their complaints are seldom more than a dull sense of fulness or weight after meals. They may even describe a sense of delay, as if their digestion had slowed up, which it actually has. The symptom will be particularly prominent after dinner, or at any rate after the heavy meal of the day. There is no pain, no heartburn, and perhaps only a slight amount of flatulence. There is never any harm in trying an acid mixture of which the following may be found to be a useful opening move :—

℞	Ac. hydrochlor. dil. - - - -	20 minims
	Ac. phosphor. dil. - - - -	15 minims
	Liq. strychn. hyd. - - - -	2 to 5 minims
	Aq. aurant. ad. - - - -	½ ounce

The stimulating effect of the adjuvant tonics, phosphorus and strychnine, reinforce the additional acid. With an encouraging result it may be wise to prescribe hydrochloric acid in pure form; it should be given in doses of not less than 30 minims, may be conveniently added to glycerine of pepsin, and should be taken in half a tumblerful of water as a beverage at meals. The acid taste is rather pleasant and is found palatable by most. Convenient tablet preparations of this acid are aklorep (Roberts) (10 minims in each tablet) or acidol-pepsin (Bayer); three or four of each should be swallowed whole after each meal, or they may be taken dissolved.

NAUSEA

Nausea with or without vomiting is perhaps the complaint least seldom associated with a minor digestive ailment. There are, however, one or two functional types of a recognizable form. First, there is that associated with respiratory disease. The effect of coughing, especially if there be much offensive sputum, partly by reason of the powerful diaphragmatic movements and partly from the expectoration, is liable to set up nausea or vomiting, more particularly in the very young and the very old. Secondly, there is a certain special type characterized by morning-sickness. I do not here refer to the well-known reflex morning sickness of gestation, but to a nausea associated with several forms of chronic nasal catarrh. Muco-pus accumulates in the recumbent position in the naso-pharynx and trickles down the back of the throat to be swallowed during the night or in the early morning; this vicious offensive material is resented by the stomach. Hence the victim of such a chronic infection will often complain of nausea and only in the morning. The complaint is usually attributed to alcohol, often justly, but it is wise to exclude the other possibility. Thirdly, another common cause of periodic nausea is migraine. This is seldom without the concomitants of eye symptoms and headache, but these may not be remarked on by the patient. Fourthly, the gastric make-up of some individuals is curiously sensitive. The intake of food, irritating in itself as the bones of fish, or sickly in its odour as in some forms of fat, or impure in its nature as in food slightly tainted or "off," induces a quick response on their part of nausea, which may go on to vomiting. Such sensitive individuals are of the overstrung nervous type and do not require digestive remedies.

The treatment of the minor ailments of digestion often presents difficulties greatly in excess of their apparent significance. Effective attention is nowhere more valued, and nowhere is the importance of the simple question "when?" greater. Exact investigation of this point, which seldom calls for more than slight inquiry, at once lays bare a sequence of cause and effect and gives point and purpose to treatment. Without a clear picture of the real disturbance of function, attention will be merely episodic in more senses than one.

SOME OBSERVATIONS ON ARTIFICIAL PNEUMOTHORAX

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TUBERCULOSIS involves two main pathological processes: (1) a spreading ulceration, and (2) a tendency to the over-production of fibrous tissue. The latter shuts off affected areas from healthy tissues, and is nature's way of curing the disease. This process is known as "healing," and results in scar tissue formation. The principal aim of the physician is to place the patient in circumstances which will best promote healing by this growth of fibrous tissue. This most important condition is best secured by resting the affected part, and the only simple way to rest the lung is to rest the patient.

If rest and regulated exercise under the best conditions do not create a tendency to healing, other means must be tried. If, for example, after rest in bed, under the best conditions of nursing, feeding and climate, the continued activity of the disease is evidenced by a raised temperature, persistence of cough and sputum, loss of weight and other signs, it is useless to expect a cure by ordinary methods, and if the case is a favourable one, that is, if one lung is still normal or nearly normal, surgical methods should be adopted.

The simplest and surest way to arrest intractable disease of the lungs, and to promote a cure is to induce collapse, and as a consequence, effect surgical rest of the diseased part of the affected lung. The simplest method of doing this is by the procedure known as artificial pneumothorax, which consists in the injection of gas, usually air, between the two layers of the pleura, ultimately producing collapse of the lung of that side.

There are many cases in which it is quite impossible to produce even an initial pocket of air between the two layers of the pleura, owing to the presence of massive adhesions. If artificial pneumothorax cannot be performed, other methods of surgical interference must be considered.

It should be emphasized that it is futile to wait too long when the disease is not reacting in a satisfactory manner to ordinary medical routine and treatment. A mental picture should be made of the evolution of the tuberculous process, and the insidious microscopical spreading of the lesion, rather than dwell only on the extent and form of the disease as revealed by the physical signs.

Other indications for inducing an artificial pneumothorax besides those mentioned are (1) to effect the closure of a cavity, which is a constant source of danger, especially of hæmoptysis, (2) to control recurrent hæmoptysis. A pneumothorax is sometimes the only means of stopping the hæmorrhage, and (3) signs of commencing disease in the sound lung due to infection from the other. A pneumothorax on the worse side will often cause both to heal.

It is not proposed in this article to discuss the ordinary case of artificial pneumothorax as regards its technique, results and complications. All this, of late years, has been extensively written up, and there are many books and articles on the subject. However there are a few special considerations which will be dealt with, namely: (1) localized artificial pneumothorax; (2) the division of adhesions; (3) the importance of X-ray control in pneumothorax cases; (4) observations on the effect of high altitude in artificial pneumothorax; and (5) discontinuing an artificial pneumothorax.

LOCALIZED ARTIFICIAL PNEUMOTHORAX

It is a generally accepted maxim that if, when inducing an artificial pneumothorax, it is impossible to obtain anything except a small pocket, containing perhaps 200 or 300 c.cm. of air only, and with a rapidly rising pressure, it is valueless to continue the treatment. While this is the case as a general rule, there are certainly instances in which even a small localized pneumothorax, such as this, may prove of great value. If, for instance, the patient has previously had pleurisy in the lower part of the chest causing massive adhesions, it is naturally impossible to obtain anything like a complete collapse. However, cases occur; I have had a number during the last two or three years in which the actual disease was localized in the upper lobe, a cavity usually being present, the pleura below this being massively adherent. In some of these cases I have been able to obtain a small pneumothorax in the upper lobe by going high up, either just below the clavicle, or high up in the axillary line. It is quite feasible, and is actually a fact, that such a small pocket, by exerting considerable pressure, can eventually cause a cavity in its neighbourhood to flatten, and ultimately to close. This has been the case in three patients during the past winter. All three left the sanatorium after several months with their cavities completely obliterated and replaced, in each case, by a fibrous scar. All three also lost their sputum, tendency to fever, and, in addition, the blood sedimentation rate, from being much too high, became normal. Even in cases in which the reverse conditions obtain, a localized pneumothorax may be of great value.

I had a patient here this winter with disease plus cavity in the upper lobe. Below this the lung appeared to be normal. A pneumothorax was attempted, and an air pocket at the base, holding about 400 c.cm. at the most, was obtained. This was continued in the hope that it would prove beneficial. It did so, the cavity closed, the patient's condition improved immensely, the sputum ceased, and he left the sanatorium after some months quite well. In this case the localized penumothorax acted in a similar manner to a phrenic avulsion, by exerting pressure on the diseased part of the lung, thereby resting it, and also promoting a progressive fibrosis.

An important matter in these small localized pneumothoraces is that high pressure can be used, much higher than in ordinary uncomplicated cases without adhesions. This is due to the fact that in these cases the pleura and tissues generally are rigid and thickened, therefore there is no danger of causing undue displacement of the heart and mediastinum by the employment of high pressures. It is due, no doubt, to high pressures being possible that good results are obtained in cases of this kind. These localized pneumothoraces, although an intrapleural intervention, act in a very similar way to the extrapleural plombage, but without its attendant risks of complications, as no foreign body is employed.

Investigations are actually being carried out in Davos at the present time in cases of complete pneumothorax in apical cases, in which the lower part of the lung is healthy, with the object of creating artificial adhesions in the healthy part, and continuing a localized pneumothorax over the diseased area. This is effected by the injection of glucose into the pneumothorax. The argument in favour of this is, that it seems a pity to have to put out of action the whole lung, when perhaps two-thirds of it or more are normal, also cases of pneumothorax often occur in which it is advisable or necessary to perform another intervention on the opposite side, an intervention which would be inadvisable or even dangerous with the whole of the other lung collapsed. If, however, by this method of creating artificial adhesions, the lower healthy part of the collapsed lung can be enabled to function normally, it would be much safer to perform a double pneumothorax, or plombage, or phrenic avulsion on the opposite side. I believe that there is a great future for this particular method of creating artificially a localized pneumothorax. It simply means the production of a selective collapse, the diseased parts of the lung being put at rest, and the healthy ones functioning. These small pneumothoraces tend to become quickly obliterated, the end result being a mass of fibrous tissues in the situation of the old lesion.

DIVISION OF ADHESIONS

The scope of artificial pneumothorax treatment has been greatly increased of late years by the procedure of dividing adhesions, and, in difficult cases, of enucleating them right out of the chest wall, by the method developed by G. Maurer, of Davos, in which a combination of the diathermic and galvano-cautery is used. This procedure has now reached a stage where it is almost absolutely safe and free from complications. Many of the patients do not even get a reaction, and other serious complications, such as purulent effusions or hæmorrhage into the pneumothorax, practically never occur. This procedure is necessary in cases where a good collapse has been obtained but a cavity is prevented from closing by the presence of band-like adhesions. For the technique of this, special literature must be consulted.

THE IMPORTANCE OF X-RAY CONTROL IN ARTIFICIAL PNEUMOTHORAX CASES

It is impossible to emphasize too strongly the necessity of X-ray control during the course of treatment of artificial pneumothorax. In many persons with an elastic and mobile mediastinum it is easy to overfill the pneumothorax without being aware of it. A great deal of air may be introduced without undue rise of pressure, and the manometer reading may give quite a false idea as to what is actually happening. When the tissues are young and elastic, the whole mediastinum and heart may be pushed right over, leaving the spinal column bare, and even showing an air-space between it and the mediastinum on the uncollapsed side. Results which may follow this are dyspnœa, derangement of the heart's action, sometimes permanent, and paralysis of the recurrent laryngeal nerve. These cases must be decompressed at once. X-ray control is also valuable in cases where there is an effusion, or in order to localize the presence, number and position of adhesions where division of these is contemplated. In the latter cases a stereoscopic radiograph, or a thomagraph should be taken.

OBSERVATIONS ON THE EFFECTS OF HIGH ALTITUDE IN ARTIFICIAL PNEUMOTHORAX

A pneumothorax is a closed cavity containing gas, usually air, and as such it follows Boyle's law of pressure, that is, " a volume of gas is inversely proportional to the pressure to which it is subjected," therefore when a patient ascends to high altitudes, the gas in the pneumothorax expands according to this law, and on descending the reverse is naturally the case. It will be understood that it is of great practical importance to bear in mind that when pneumothorax patients are transported from the lowlands to a high altitude, say 5,000 ft., the gas in the pneumothorax expands, and conversely when they descend again to the plains it contracts. A patient, therefore, being sent to the mountains should not have a refill just beforehand, and the pressure should be kept low, in order to allow for the expansion of gas in the pneumothorax. On two or three occasions I have had patients arrive at Davos in a state of acute dyspnœa, heart and mediastinum displaced, and in a really serious condition. They had been given refills just before the journey, and the ascent was equivalent to another one. Decompression in these cases had to be performed at once. Conversely when a patient is sent home again to the plains, a good filling should be given, in order to allow for the decrease of the volume of gas due to the lower barometric pressure. A volume of 2,000 c.cm at sea level increases roughly by 80 c.cm. for every rise of 1,000 ft. The pressure in a pneumothorax cavity rises and falls *pari passu* with the barometric reading. There are certain other clinical observations indicating that the behaviour of a pneumothorax seems to differ in some degree in high altitudes from its behaviour in the plains. I do not attempt to explain the reason for these apparent differences, I merely give them as a result of clinical observation over many years' experience. It seems that (*a*) a selective collapse is more likely to be obtained in the mountains than at sea-level, that is to say, there is more often seen a complete collapse of the diseased area, especially in the upper lobe, whilst the healthy lower lobe continues to function. (*b*) Air is apparently retained for a longer period in the mountains, and refills less frequently necessary. (*c*) Less pressure seems to be required to obtain the desired amount of collapse. In spite of the height no undue breathlessness or other inconveniences occur after fillings. (*d*) There seems to be less tendency for a pneumothorax to obliterate in the mountains. I have seen many cases which, on returning home, have quickly shown a tendency to obliterate.

It is a great mistake to imagine, as many people appear to do, especially patients themselves, that the successful induction of a good pneumothorax is a cure for the disease. This is not so; it is simply a means by which, in time, a cure may be obtained. The diseased lung is put at rest, and is in a much more favourable position as regards ultimate healing, but until this occurs, say in two or three years' time, the ordinary routine treatment must still be carried out. That is why these cases, without doubt, do so well in a mountain climate with its dry, cool air. The combination of collapse therapy and climatic treatment places the patient in a favourable position as regards permanent recovery.

DISCONTINUING THE PNEUMOTHORAX

This is one of the most important considerations of the whole treatment. If, after a specified time—two or three years in most cases—it is decided to discontinue the treatment, the greatest care should be taken and constant X-ray controls employed. The lung should be let out, say two-thirds of the way. Auscultatory signs combined with a good radiograph will then show with fair certainty whether the lesion has healed or not. If it is seen, for instance, on letting the lung partially expand, that a former cavity is not yet firmly healed, or is re-expanding with the lung, the latter should be collapsed again at once, otherwise all the work of many months is likely to be wasted. Other signs and symptoms to which attention should be paid when the lung is re-expanding, are the return of cough, sputum, tubercle bacilli, or other signs which show that the disease is not absolutely inactive, in other words, a pneumothorax should not be discontinued until the physician is as certain as he can be that the lesion is really fibrosed and healed. It should be remembered that in the large majority of cases, once the lung is completely re-expanded, and the two pleural surfaces have come into contact, the pneumothorax can seldom be re-induced. In a few instances, where the pleura is absolutely healthy, and has not been infected by the disease, re-induction may be possible, even after complete re-expansion, but in 90 per cent. of cases at least the pleura is affected. This is borne out by the experience of a large number of thoracoscopic examinations, when performing the operation of dividing adhesions. In such cases the two layers of the pleura become adherent at once when they come into contact.

DIPHTHERIA IMMUNIZATION:

SOME IMMEDIATE AND VITAL ISSUES

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ACTIVE immunization against diphtheria has made an appeal to such a significant section of the populace that it is now essential for certain matters to be elucidated. One point at issue is this, and it is highly important: what are Public Health authorities and general practitioners to announce to the public as the legitimate claims to be made for active immunization? There is not at present any uniformity about the statements made. Some medical authorities say nothing specific, but issue literature for propaganda purposes which leaves the impression that the procedure will inevitably be successful. Others, equally culpable, give injections, even of the one-shot variety, uncontrolled by any subsequent Schick test. The establishment of the Schick-negative state plays no part in their calculations. Their technical knowledge has often been gleaned from some woefully under-informed commercial travellers. Obviously the general practitioner is more likely to be the prey of vendors of unsuitable prophylactics than is the Public Health officer. The latter has many colleagues who are readily consulted when a product is offered for which extravagant claims are made.

There is yet another class of worker, the man who insists that his patients shall be fully cognizant of what he has attempted to do for them. He will not issue a certificate of apparent immunity without an added explanation of its full significance. In early years the tendency was to state that, by means of active immunization, all diphtheria was preventable. It was rapidly obvious that such a hope was not strictly tenable. A few cases of mild or moderate diphtheria do, and must, occur among immunized persons. The statement applies equally to naturally Schick-negative individuals.

SUITABLE PROPAGANDA

The following is suggested as a suitable summary of the real position which might be put before the public as a whole :—

> Protective injections against diphtheria act by making the blood able to resist the poisons of diphtheria germs. As practically all the harmful effects of the disease are brought about by these poisons, the value of this protection will be realized. Only a few persons who have been thoroughly treated and proved to be immune by a test ever contract the disease. Such attacks of diphtheria after protective injections are nearly always slight.

Such candour would automatically terminate many of the activities of those who are opposed to diphtheria prophylaxis.

Immunization consists of educating the body in the art of producing diphtheria antitoxin when required, rather than of giving to the blood a protective substance which will actually be retained by the body throughout life. An appreciation of this fact, and the realization that antitoxin produced in the body is also slowly lost, will do much to clarify the position. Thus naturally immune subjects may fluctuate between the " just immune " and " just susceptible " states. The degree to which the immune subject retains his protection is in part determined by the extent to which he comes in contact with diphtheria infection. The immune subject who meets with small doses of diphtheria bacilli in the course of contact with his fellows, retains his immunity well. In the absence of any contact with the disease at all, some protected subjects undoubtedly become less immune. Persons belonging to the latter class may contract what might be described as " temporary " and usually trivial diphtheria if, during a period of low blood antitoxin content, they encounter adequate infection. Their previous training, whether due to natural or artificial immunization, enables them to produce their own antitoxin so rapidly that in a number of cases the disease is self-curative, and no harm to the body results. There is little or no disturbance of the pulse rate, and often such patients are able to leave their beds within a few days, without fear of sequelæ. When positive swabs are obtained in the presence of even a small amount of really typical membrane, such attacks must be admitted to be diphtheria.

The important point to be realized and broadcast is the triviality of the majority of such attacks in any subject who has ever been proved to be Schick-negative, either naturally, or as a result of injections of diphtheria prophylactic.

VIRULENT ORGANISMS

One point must be considered in connection with more serious types of diphtheria infection. Although a subject is definitely Schick-negative, this degree of protection may occasionally not be adequate to prevent infections by virulent intermediate or gravis strains of the bacillus from producing well-marked local lesions. In the case of such grave infections (which kill many unprotected children if there is the slightest delay in administering antitoxin) a moderate attack of diphtheria may occur in an apparently immune person. But here again the basic protection of active immunization stands the immunized subject in good stead, and his attack is infinitely more mild than is the case in an unprotected fellow. From the foregoing it may be inferred that the aim of the doctor undertaking prophylaxis should be to confer as high a degree of immunity as possible on the subjects treated, and not merely to attempt to produce a " just Schick-negative " state.

WHAT CAN HEALTH AUTHORITIES CLAIM?

After consideration of these facts, which are none too well known even to many medical men, it does appear that some simplified statement is due to the general public. The form this might take has been suggested earlier, and recent matter has been included to justify that declaration. The Medical Officer of Health should insist that all children coming for treatment should be proved to be Schick-negative before any certificate, or even impression, of apparent immunity is given to parents. He might then fairly make the following claim in an explanation printed on the reverse of his certificate :—

> Nearly every child who has received this treatment is completely protected against the dangers of diphtheria. A few cases of the disease may occur in the course of time among a large number of protected children. This is due to some loss of the protection, owing to a peculiarity of the child's blood or body. Such attacks are rarely serious and, as far as is known, never fatal. Nevertheless your doctor should always be asked to examine the child if it has a sore throat. It must be remembered that diphtheria is not the only serious disease which may attack the throat.

On the contrary, the health officer or practitioner who does no Schick-testing has a serious responsibility, especially if he uses methods or prophylactic material of insufficiently proven value. It behoves him to explain that one child in ten, or even more, may not be completely protected by his procedure. He fails entirely to recognize those children who do not respond to the usual course of immunizing injections. Such children have little natural capability of resisting the disease. If, therefore, the parent considers such a child to be properly immunized, when in reality it is not, there is liable to be delay in calling a physician. This vicious cycle may end in a fatality. The most such an operator can claim is a reasonable chance for the success of his procedure. The response of the general public to such a proposition might well not be enthusiastic.

It may here be stated that, in the opinion of the writer, when dealing with children of all ages, there is no safe short-cut to the three injection method if it is desired to produce adequate immunity.* If stronger toxoid or alum-toxoid preparations are to be used on large children, it is better that a special Moloney test should be employed first in order to avoid severe reactions in some subjects. This procedure is not suitable for clinics held once a week.

POSITION OF THE PRACTITIONER

At the present time there is a marked feeling in the profession that medical practitioners ought to be brought into all immunization schemes of public health authorities. There is perhaps a bias on the part of general practitioners in favour of all such immunization being undertaken by themselves, to the exclusion of any municipal clinics at all. The writer is prepared to subscribe to any view which will increase the amount of subjects immunized without placing an unduly heavy burden on the rates, but considers that the most practical solution would be to provide both types of facility everywhere. The aim must be to get as large a number of persons as possible properly treated. It must not descend to the level of a haggle between specialist and practitioner as to who shall actually do the work. Medical men anxious to practise this work ought to make themselves thoroughly acquainted with well-tried procedure and theory, and should study in detail which methods are best suited to the treatment of patients in private practice. *If a medical officer of health is to be asked to supply free diphtheria prophylactic to practitioners, or to pay a fee to them for immunizing patients privately, he should be entitled to dictate the procedure to be employed, or to satisfy himself that the practitioner has adequate practical experience of this particular work.*

Clinics cannot at present safely be abolished, for in these are found the men of wider experience who are able to advise on the difficulties which arise from time to time in the course of this work. There is much more in this subject than appears in any book of instructions issued by laboratories which prepare the material. Some of us are still learning even after ten years intensive and critical work. Further, unless all Schick-testing is to be abolished, which would seem deplorable, clinics ought to be retained as the most satisfactory places in which to make these tests. This particular work is not well suited to the consulting room, especially when performed by those not really accustomed to making intradermal injections. When only one or two cases are tested at a time in such circumstances, the results may be unsatisfactory and misleading.

GENERAL POLICY

A decision on the following questions is of national importance :—

(1) What antigens are of sufficiently proven value and general suitability for them to be employed by public health authorities and recommended to the profession for use in general practice?

(2) What procedure, or alternative procedures, should be advocated as routine for the country as a whole?

(3) What is to be the agreed announcement to the populace as the legitimate claim for immunization conducted on the lines of the answers to questions 1 and 2?

The whole matter is at present handled far too loosely, and these points should not be decided by individual local authorities. Two families, residing in neighbouring streets, are at present liable to acquire quite different ideas as to the value of immunization when they happen to live in adjoining areas with different health officers. The merits of immunization are sufficient for them to be announced from the housetops without making any exaggerated or misleading claims.

FAVOURITE PRESCRIPTIONS

NO. XII.—THE PHARMACOPŒIA OF CHARING CROSS HOSPITAL

By E. C. WARNER, M.D.
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At its foundation, Charing Cross Hospital was established with the dual purpose of treating the sick poor and of educating medical students—the only hospital in London which started *ab initio* with this object. In this, its centenary year, the new edition of the Pharmacopœia is designed to keep these objects simultaneously in view. From the patient's standpoint, the prescriptions which have been found by long usage to be the best are incorporated, while the student will find for ready reference all the preparations of the British Pharmacopœia with their doses. At the same time it has been designed as a vade mecum for house officers and other newly-qualified medical practitioners who are called upon to write prescriptions perhaps for the first time or to know the uses of many drugs which may not be incorporated in the B.P. or the B.P.C. This alone may be sufficient reason for including such drugs as nepenthe, a favourite anodyne (B.P. 1914) still often prescribed on the third or fourth day after operations, and much more pleasant to taste and rather less powerful than the official tincture of opium as it contains 0·84 per cent. of anhydrous morphine. As an illustration of an unofficial recently-introduced drug, salyrgan may be mentioned, for it is a powerful diuretic, especially when given intravenously in doses of ½–2 c.cm. combined with full doses of ammonium chloride (1 to 3 grammes three times a day by mouth).

MIXTURES

In any pharmacopœia of a general hospital, mixtures often take pride of place as being most in demand. It may at first sight seem strange to have aspirin dispensed in a mixture (Mistura acidi acetylsalicylici):—

℞	Acidi acetylsalicylici	10 grains
	Mucilage of tragacanth	60 minims
	Chloroform water	to 1 fl. oz.

There is good reason for this: about 10 tons of aspirin are consumed in the United Kingdom each year, and many persons swallow the usual tablet whole and complain of indigestion afterwards—readily accounted for by the insoluble nature of the drug. In addition, a placebo of this type is most valuable for a day or so in a case of obscure pyrexia. A combination of anti-rheumatic drugs is met in the popular prescription labelled Mistura arthritica:—

℞	Potassium iodide	5 grains
	Sodium salicylate	5 grains
	Sodium bicarbonate	5 grains
	Guaiacol carbonate	5 grains
	Mucilage of tragacanth	60 minims
	Chloroform water	to 1 fl. oz.

This mixture is useful in so far as it tends to relieve pain, and at the same time is safe, even when often repeated—a point of especial importance in dealing with such an obstinate condition. Cascara sagrada is universally a popular remedy as an aperient, and the liquid extract is so bitter that it acts as a stomachic at the same time. These properties are enhanced by the addition of nux vomica, which tends to reinforce the action of the muscular coat of the intestine, while belladonna relieves griping. In combination these drugs therefore act as a powerful stimulant to digestion and as a useful preparation in constipation. To mitigate the extreme bitterness, spirits of sal volatile and the liquid extract of liquorice are added, with a resultant mixture (Mistura cascaræ sagradæ composita):—

℞	Liquid extract of cascara sagrada	40 minims
	Tincture of belladonna	5 minims
	Tincture of nux vomica	10 minims
	Aromatic spirit of ammonia	20 minims
	Liquid extract of liquorice	30 minims
	Chloroform water	to 1 fl. oz.

A recent addition which has proved popular is Mistura influenzæ :—

℞	Sodium salicylate	15 grains
	Ammoniated solution of quinine	60 minims
	Dilute solution of ammonium acetate	240 minims
	Liquid extract of liquorice	20 minims
	Mucilage of tragacanth	60 minims
	Cinnamon water	to 1 fl. oz.

In this is to be found a combination of drugs which tends to relieve the muscular pains of influenza and stimulates the action of the skin; at the same time the quinine and cinnamon have a well-deserved reputation for treatment of the catarrhal symptoms, and the liquorice not only more than counterbalances the astringent effects of the cinnamon, but is a covering agent to minimize the unpleasant taste.

The most popular of the four expectorant mixtures has proved to be Mistura ipecacuanhæ composita, which has been almost unaltered over a period of at least thirty-five years :—

℞	Tincture of ipecacuanha	7½ minims
	Ammonium carbonate	2 grains
	Sodium bicarbonate	15 grains
	Camphorated tincture of opium	15 minims
	Chloroform water	to 1 fl. oz.

This mixture is a mild stimulating expectorant, the virtues of which are sufficiently evident without enumeration.

Mistura magnesii et belladonnæ (Mistura gastrica) combines the antacid properties of magnesium carbonate, bismuth carbonate and sodium citrate, with the astringent properties of bismuth salts, and at the same time the magnesium carbonate prevents constipation. Tincture of belladonna is added to diminish gastric secretion, the resulting mixture being :—

℞	Light magnesium carbonate	10 grains
	Bismuth carbonate	10 grains
	Tincture of belladonna	7½ minims
	Sodium citrate	15 grains
	Peppermint water	to 1 fl. oz.

This mixture is popular for cases of hyperacidity and of peptic ulcer. There is no risk of alkalosis with this mixture, and the sodium citrate dispenses with the need of separately citrating the milk feeds. It is prescribed in doses of 1 fl. oz. three or four times daily, the last dose often being increased to 1½ or 2 fl. oz. at bed time in order to prevent acid accumulating in the stomach during the hours of sleep.

Linctus.—Dr. Fenton originally introduced Linctus anisi, as an adaptation in linctus form of the Brompton lozenge (liquorice and aniseed) :—

℞	Oil of aniseed	1 minim
	Chloroform	1 minim
	Vinegar of squill	10 minims
	Liquid extract of liquorice	10 minims
	Mucilage of tragacanth to	60 minims

This simple linctus is still the favourite, for not only does it sooth the pharyngeal and bronchial mucous membrane, but it has a mildly expectorant action at the same time.

PILLS AND POWDERS

Pills.—Among the pills, four are worthy of mention. Pilula aloes composita has been in popular use for twenty years.

℞	Aloes	1½ grains
	Exsiccated ferrous sulphate	1 grain
	Dry extract of belladonna	⅛ grain
	Dry extract of nux vomica	¼ grain

It is especially useful in the subjects of chronic constipation with secondary anæmia and may, with advantage, be taken regularly for several weeks. The bitter principle of aloes combines aperient and stomachic properties, and to relieve the spasmodic action on the intestine and yet enhance muscular activity, the belladonna and nux vomica are added. Pilula cascaræ sagradæ composita :—

℞	Dry extract of cascara sagrada	2½ grains
	Dry extract of belladonna	⅛ grain
	Dry extract of nux vomica	¼ grain
	Liquid glucose	q.s.

has a similar action, but the ferrous sulphate is omitted as this pill is more powerful and rapid in action than the previous one, and is only prescribed in occasional doses when required.

Pilula hydrargyri subchloridi et colocynthidis—

℞	Calomel - - - - - - -	2 grains
	Compound extract of colocynth - -	3 grains

is much more powerful than either of those abovementioned, but as a powerful hydragogue purgative that causes little griping it can be strongly recommended.

The fourth pill is Pilula codeinæ et belladonnæ.

℞	Codeine phosphate - - - - -	½ grain
	Dry extract of belladonna - - -	¼ grain
	Kaolin - - - - - - - -	2½ grains
	Hard soap to - - - - -	4 grains

In this are combined two drugs with a marked antispasmodic action, and with the power of relieving pain originating in plain muscle. To obtain a full effect, this pill needs to be taken regularly over a period of weeks and it is designed for administration particularly is cases of painful colospasm.

Powders.—One of the most useful powders is that for the first-aid treatment of burns and scalds, as recommended by Davidson. To lessen the development of sepsis under the hardened surface, acriflavine is added. This tannic acid powder with acriflavine has the composition—

℞	Tannic acid - - - - - -	30 grains
	Acriflavine - - - - - -	1½ grains
	Warm sterile water to - - - -	3½ fl. oz.

This forms a 2 per cent. solution of tannic acid. This powder should be among the equipment of every practitioner, as the pharmacopœial instructions "to be dissolved immediately before use, and applied with sterile brush, or on gauze soaked in the solution, or in a spray" are easily carried out.

For use in the outpatient "gastric clinic" as well as for routine use in the wards in the treatment of peptic ulcers, the gastric powders A, B and C have been devised. These possess the advantage that their bulk is small in contrast to gastric mixtures. The three powders are :—

A. Chalk.
B. Chalk—3 parts.
  Magnesium hydroxide—1 part.
C. Chalk—1 part.
  Magnesium hydroxide—1 part.
    Dose 60 grains.

These powders are safe when given in doses larger than those recommended officially, and can be varied from time to time in order to make them more aperient, by passing from A to B, or from B to C.

LIQUORS AND INJECTIONS

Liquors.—In the treatment of iron-deficiency anæmia, iron and ammonium citrate in large doses has recently found its way into a number of pharmacopœias. The difficulty of prescribing it in mixture form with a more or less set dose is met by the liquor ferri et ammonii citratis, which is a 50 per cent. solution in water. The initial dose recommended is thirty minims three times a day in milk after meals, and this can be increased by two minims daily up to sixty to eighty minims three times a day, or until the limit of tolerance is reached in each individual case. Where the gastric tolerance is very low, the Mistura ferri et ammonii citratis may be prescribed.

℞	Iron and ammonium citrate - - -	15 grains
	Aromatic spirit of ammonia - - -	15 minims
	Emulsion of chloroform - - -	10 minims
	Compound infusion of gentian - -	to 1 fl. oz.

Herein the carminative effects of the ingredients go a long way to mitigate the unpleasant digestive sequelæ, especially when taken after meals.

For blood transfusion, liquor sodii citratis fortis, which contains 1 gramme of sodium citrate in 4 c.cm. of sterile water is most useful. In the place of the weaker 2·5 and 3·8 per cent. solutions which have been in common use for years, this stronger solution does not dilute the transfused blood. In many severe anæmic conditions the less the volume of fluid transfused the better, and with this strong solution of sodium citrate used as an anti-coagulant, it is not only much more portable in a sterile phial, but 4 c.cm. are sufficient to prevent the coagulation of at least 15 oz. of blood.

Injections.—For the treatment of hæmorrhoids there is a choice of two formulæ. Injectio phenolis is a 20 per cent. solution of liquefied phenol in equal parts of glycerin and distilled water. It is now becoming much more the custom to inject a weaker solution into the submucous tissues as a perivenous injection rather than to use an intravenous hæmorrhoidal injection. This has given rise to the use of Injectio phenolis et olei amygdalæ :—

℞	Phenol - - - - - - - -	20 grains
	Menthol - - - - - - -	1 grain
	Almond oil - - - - - - -	to 1 fl. oz.

This represents a solution containing just under 5 per cent. of phenol, with the addition of 0·2 per cent. of menthol as a local anæsthetic, and of this 5 c.cm. can be injected perivascularly around each of not more than two separate hæmorrhoids at one time.

CONFECTIONS AND OINTMENTS

Confections.—For rectal and anal disorders, a number of "jams" have been evolved at different times. The one in popular use and represented in the present pharmacopœia as rather stronger than the official Confectio sennæ B.P., and is known as Confectio sennæ composita :—

℞	Powdered jalap - - - - - -	3 grains
	Senna leaf - - - - - - -	3 grains
	Sublimed sulphur - - - - - -	3 grains
	Black treacle - - - - - - -	to 60 grains

Dose 60–120 grains.

This easily-remembered formula gives a soft comfortable stool at least once a day, without unpleasant anal irritation and yet is certain in its effects.

Ointments.—The majority of the ointments still in use are those adopted years ago as standard preparations at the suggestion of Dr. J. M. H. MacLeod. Unlike those of so many hospitals, they contain relatively few ingredients, but those that are present are carefully selected for their therapeutic values. As an illustration of this for use in cases of seborrhœa of the scalp may be quoted Unguentum sulphuris et acidi salicylici dilutum.

℞	Sublimed sulphur - - - - - -	15 grains
	Salicylic acid - - - - - -	10 grains
	Soft paraffin - - - - - - -	to 1 oz.

This is often followed by an equally simple lotion of Dr. MacLeod's, Lotio acidi salicylici et olei ricini :—

℞	Salicylic acid - - - - - -	10 grains
	Castor oil - - - - - - -	20 minims
	Industrial methylated spirit - - - -	to 1 fl. oz.,

which still maintains an antiseptic action but is stimulating to the scalp at the same time.

Among the few new ointments that have appeared, Unguentum benzoini et zinci is well worth attention :

℞	Compound tincture of benzoin - -	2 parts
	Boric acid ointment - - - - -	4 parts
	Zinc ointment - - - - - -	4 parts
	Olive oil - - - - - - -	1 part

This was originally introduced by Mr. R. C. B. Ledlie to the writer, who can warmly testify to its value with small ulcers and fissures. The pain these cause is often quite out of proportion to their size, especially with cracked nipples and small anal fissures, and the mental as well as the physical relief occasioned by the incorporation of the compound tincture of benzoin for its anæsthetic effect is as marked as the stimulating effect of the three principle ingredients on the healing process.

PRACTICAL NOTES

PINK DISEASE

It is probable that this disorder is more common than usually supposed, and one of the sessions at the recent Melbourne Meeting of the British Medical Association was devoted to a discussion of the main features of the malady which appears to have been first clearly defined in Australia just before the war. C. F. Harris (*St. Bartholomew's Hospital Reports*, 1935, lxviii, 137), has recently collected observations on six examples of this disease of infancy. All were between six and twelve months of age when brought to hospital with symptoms present for three weeks to three months. The presenting symptom in all cases was loss of weight, vomiting or refusal of food and all showed the excessive misery so characteristic of the disease, together with great irritation of the skin (with or without the " pink " rash on the extremities which gave the disease its name), muscular flabbiness, tachycardia and some degree of wasting. Loss of sleep, sudaminal rashes with excessive sweating, photophobia and stomatitis are other features of the illness. The course is usually one of very slow recovery, although death occurred in one infant from gastro-enteritis. There appears to be no specific treatment: large doses of vitamin preparations are employed and blood transfusion was used in some patients. Careful and patient nursing appears to be the only form of treatment to which any real credit can be given. It may be added that other observers have suggested the symptomatic use of sedative drugs such as chloral to deaden the obvious irritability always present.

COLLOIDAL SULPHUR IN CHRONIC ARTHRITIS

Sulphur in one form or another has been used as a therapeutic agent since ancient times. Of recent years claims have been made for the special value of this substance in chronic arthritis and from a careful study of the subject, W. B. Rawls, B. J. Gruskin and A. A. Ressa (*American Journal of the Medical Sciences*, September, 1935, cxc, 400) conclude that colloidal sulphur is a valuable agent in this condition. Fairly large doses (10 to 30 mgm. twice weekly) are as a rule well tolerated. An interesting observation made concerned the cystin content of the finger-nails: when this was below normal it was usually increased with sulphur therapy and the percentage and degree of clinical improvement was greater in those patients with a subnormal cystin content of the nails than in those with a normal content. Certain patients were treated with Ringer's solution intravenously as a placebo measure and it was demonstrated that the percentage and degree of clinical improvement was greater with sulphur than with placebo therapy. Those patients who showed improvement in the focal symptoms also showed marked improvement in constitutional symptoms, i.e. less fatigue, an improved appetite and gain in weight. The dose employed was an aqueous solution of colloidal sulphur containing 10 mgm. per c.cm. Usually 2 c.cm. of this were given twice weekly intravenously or intramuscularly.

HISTIDINE IN PEPTIC ULCER

A preliminary communication on the treatment of peptic ulcer by means of injections of a preparation of histidine made by J. W. Köning (*Schweizerische Medizinische Wochenschrift*, October 19, 1935, lxv, 1006), confirms the views of other authorities who have used this method. It is claimed that it can be employed for ambulant patients without any special systematic dietetic restrictions. It has been found best for gastric ulcers, and Köning considers that further investigation is necessary before its value for duodenal ulcer can be determined. In the cases recorded in present communication the preparation used was larostidin (Hoffmann-La Roche), and according to the selected case records it appeared to achieve successful results when other methods had failed. No details are given of dosage save that twenty-one injections in all were given in each case.

INCREASE OF WEIGHT IN PREGNANCY

Leaving out of account patients over 35 years of age and over 10 stone before pregnancy, J. L. Wodon (*Bruxelles-médical*, October 13, 1935, xv, 1375) has studied various aspects of the increase of weight occurring during the gestation period. He finds that the total gain in weight at the end of normal pregnancy is approximately 20 per cent. above what it was at the beginning. During the first sixteen weeks of pregnancy the gain in weight is slight in 80 per cent. of cases, and of little importance. During the last twenty-four weeks the gain in weight is of some practical value, especially as an early indication of toxæmia. According to Wodon's figures for 400 patients the maximum increase for a normal pregnancy should be approximately 2 lb. for two weeks, or 4 lb. for four weeks. While a gain up to these limits does not completely exclude toxæmia it was noted that such disturbance only occurred in 8 per cent. of women whose gain was within these limits. On the other hand, in a group of 94 (out of the 400 studied) in whom the gain in weight was above a pound per week, 72 presented evidence of one of the toxæmias of pregnancy. It is therefore considered that this simple test, easily applicable in antenatal work, offers an important danger signal of approaching toxæmia.

HEAT IN DISEASES OF THE NERVOUS SYSTEM

Heat is frequently utilized in the treatment of both organic and functional disorders of the nervous system, and C. A. Patten has recently reviewed the subject (*Journal of the American Medical Association*, September 7, 1935, cv, 797). In the psychoses he considers heat especially of value as a sedative in the agitated and maniacal mental states. The means by which heat is applied—in order of their efficacy—in mental states are as follows:—(1) The continuous hot bath. (2) The cold pack. (3) The warm pack. (4) Cabinet sweats. (5) Continued heat. The continuous hot bath is used particularly in cases of maniacal excitement and maintains a steady temperature of 96° to 98° F., and sometimes more. Large baths are used with canvas slings and many patients receive their meals, sleep and may stay in the baths for several days. Packs, cold or warm, are also useful but must not be used when the patient is in a weakened state. In the psychoneuroses heat is also useful (as introduced by Weir Mitchell) and Patten recommends the so-called "tonic electric cabinets." In neuritis the value of dry heat is well recognized and even in chronic diseases of the nervous system, such as hemiplegia and lateral sclerosis, heat will decrease the spasms and contractures.

EPISTAXIS IN CHILDREN

Believing that a correct knowledge of the cause is essential for efficient treatment of epistaxis in children, E. Wessely (*Wiener klinische Wochenschrift*, October 4, 1935, xlviii, 1214) discusses the subject under eight main headings. (1) Trauma is placed first and it is stressed that complications, such as a hæmatoma of the nasal septum and fracture of the nasal bones, must be kept in mind. (2) Foreign bodies are common and although bleeding is usually slight it is important to remove these structures as soon as possible. (3) Bleeding from changes in the mucous membrane at a localized spot in the septum may occur and may be associated with a rhinitis sicca or even with a perforating ulcer of the septum. (4) Ulcers due to tuberculosis and congenital syphilis may cause bleeding. (5) Tumours of a sarcomatous nature are rare but must be borne in mind. (6) Nasal diphtheria may cause recurrent small hæmorrhages. (7) Symptomatic epistaxis occurs in cardiac failure and at the beginning of infectious fevers. (8) Certain important disorders of the blood or capillaries may cause serious epistaxis. These include thrombocytopenic purpura, hæmophilia, leukæmia and hereditary telangiectesis.

Correction.

An error was made in the November issue (p. 658) in the formula of Dobell's solution. This should contain *one* minim of liquid carbolic acid instead of 60 minims as stated. The prescription should read :—

℞	Sodium bicarbonate - - - -	3 grains
	Sodium biborate - - - - -	3 grains
	Liquid carbolic acid - - - -	1 minim
	Water to - - - - - -	1 ounce

REVIEWS OF BOOKS

Antenatal and Postnatal Care. By FRANCIS J. BROWNE, M.D., F.R.C.S.E., F.C.O.G. London: J. and A. Churchill, Ltd., 1935. Pp. xv and 480. Illustrations 58. Price 15s.

THIS authoritative and in every respect admirable work is dedicated by Professor Browne, of University College Hospital, to the memory of his late chief and friend, J. W. Ballantyne, of Edinburgh, who, after bringing out a classical monograph on diseases of the fœtus, became a pioneer in the care and morbid conditions of the mother. The present tendency to criticize antenatal care, because it has so far failed to reduce maternal mortality, is dealt with convincingly; the reasons explaining this failure are shown to be: (i) the increase of primary as compared with subsequent pregnancies, which would be anticipated in view of the falling birth-rate; (ii) the inadequate and inefficient character of antenatal care as widely undertaken; and (iii) that it has led to much unnecessary surgical intervention. Well-illustrated chapters deal with the equipment of the clinic room, the examination of the pregnant woman, and the diagnosis of early pregnancy. Dr. Grantly D. Read, in a valuable chapter on the influence of the emotions on pregnancy and parturition, shows that in cultured, as opposed to primitive, women fear, which is neuro-muscular hypertension, is responsible for the pains of labour, and how this can be obviated by instruction in both the muscular system and the mind. Professor Browne deals systematically with abnormalities, such as those of presentations, with hyperemesis, eclampsia, and in fact with all the diseases complicating pregnancy and parturition in the manner that would be expected from him. The last chapter, devoted to postnatal care, is followed by six useful appendices on practical matters, such as the medicinal induction of labour, the low protein and the ketogenic diets.

The Hair and Scalp. By AGNES SAVILL, M.A., M.D., M.R.C.P.I. London: Edward Arnold & Co., 1935. Pp. viii and 288. Illustractions 54. Price 12s. 6d.

THIS useful book is planned on the same system as the late Dr. T. D. Savill's well-known textbook on clinical medicine, the chief symptom complained of by the patient being investigated and followed by a list of its possible causes; the disease is fully described in the chapter which deals with its characteristic symptom, and the other possible causes are passed in review and briefly differentiated. Such a system has been criticized in a textbook for medical students, but there is no doubt about its practicability in a book intended for practitioners, as this is, where, instead of more or less unfamiliar terms, such chapter-headings are found as "Hairfall with bald patches" and "Scaly conditions of the scalp." Other practical sections of the book deal with such subjects as hair dyes and "permanent waves." Mr. W. T. Astbury contributes a valuable chapter on the molecular structure of the hair. The book is well produced, with adequate illustrations and a good index, and it should prove of great service to every general practitioner.

The Treatment of Acute Poisoning. By H. L. MARRIOTT, M.D., M.R.C.P. London: The Middlesex Hospital Press (John Murray), 1935. Pp. xii and 45. Price 5s.

ABANDONING completely the usual "poison-antidote" method of dealing with the subject, Dr. Marriott, out of his extensive experience as a senior resident officer of a large hospital, has gone back to first principles and built up a system for treating patients with acute poisoning, which should, properly applied, save many lives. He tells his readers clearly "what to do" (and why) and "how to do it"—the two sections into which his book is divided, and the little over forty pages of this slim volume contain a vast amount of practical common sense. It is a striking feature of modern times that pride of place, so to speak, has to be given to gas-poisoning, but older poisons are not forgotten, and an improved method of gastric lavage should have a wider application than in the realm of toxicology. This is certainly a book which all general practitioners should study.

An Introduction to General Therapeutics. By H. K. FRY, D.S.O., M.D., B.Sc., D.P.H. London: Cassell & Co., Ltd., 1935. Pp. 223. Price 6s.

DR. FRY, who is lecturer in Materia Medica and Therapeutics in the University of Adelaide, has written this small book to provide a concise survey of therapeutic measures as an introduction to the subject for medical students. He has succeeded in producing an easily-readable volume, brim full with facts and covering a wide field. Drugs, vaccines, physical methods and psychotherapy are all included and such important subjects as rest and exercise receive due emphasis. Here and there the book could be improved: for example, in a section on the use of oxygen and carbon dioxide the student is not told which methods of administration are useful and which are useless, and a short section on infant feeding had better be omitted or considerably expanded. Apart from such minor criticisms the book is a satisfactory contribution to a complex subject and should prove of considerable help to the student if he will dip into it while studying other aspects of disease.

A Practical Handbook of Midwifery and Gynæcology. By W. F. T. HAULTAIN, O.B.E., *M.C.*, F.R.C.S.E., M.R.C.P.E., F.C.O.G., and CLIFFORD KENNEDY, F.R.C.S.E., M.C.O.G. Second Edition. Edinburgh: E. and S. Livingstone, 1935. Pp. xxii and 356. Illustrations 44. Price 15*s.*

IT is nine years since the appearance of the first edition of this book, and the greater part has been rewritten. The book is written in the form of a synopsis, and few words are wasted. It is remarkable how much useful knowledge has been crammed into so small a work. The book lives up to its title in dealing especially in the practical side of the subject, and undoubtedly it will prove not only a most useful aid for the student preparing for his examinations, but also in ready and practical reference for the practitioner. Few points in the book call for criticism, but the unduly pessimistic view of the authors towards fœtal mortality following breech labours in primiparæ is interesting, and would undoubtedly cause considerable surprise to competent sister midwives. It is rather surprising to find that pressure on the cord as a cause of fœtal death is given the first place over intracranial hæmorrhage. Vaginal examinations in primiparæ, at their first visit early in pregnancy, are not altogether desirable, and are not likely to produce a favourable attitude on the part of the patient towards her coming confinement. Further, a vaginal examination with two fingers as early as the thirty-fifth week as a routine in primipara must cause a certain amount of discomfort. With a little delay, such an examination will become unnecessary in the majority of cases. These points are merely matters of opinion, and do not detract from the value of the book, for the excellence of which the authors are to be congratulated.

The Pathology of Internal Diseases. By WILLIAM BOYD, M.D., F.R.C.P. Second edition. London: Henry Kimpton, 1935. Pp. 904. Illustrations 335. Price 45s.

PROFESSOR BOYD, of Winnipeg, is the author of two successful books, both in second edition, dealing with much the same material, so that they may easily be confused. One is a *Textbook of Pathology: An Introduction to Medicine*, which includes the whole subject without distinction between internal medicine, surgery, and diseases of women. The present work is devoted to a consideration of the diseases under the first category and is specially valuable for the correlation of lesions and symptoms. Though there is necessarily overlapping between the two works and some illustrations are common to both, verbal repetition, which might be very natural, has been skilfully minimized. Thus he points out that with the possible exception of epidemic encephalitis there is no disease in which it is more difficult to explain the symptoms by the morbid changes than Bright's disease, and then proceeds to an analysis of present knowledge. The use of the term nephrosis, introduced by Friedrich Müller in 1905, is criticized as responsible for much confusion, and in any case impossible to diagnose accurately without prolonged observation of the patient. The accounts of the morbid changes are supplemented by summaries of the clinical features and in some places by illustrations of patients. While expressing his own opinions quite clearly but unobtrusively, the author gives short lists of references, especially those of recent advances.

Arthritis and Rheumatoid Conditions: Their Nature and Treatment, By RALPH PEMBERTON, M.S., M.D., F.A.C.P. Second edition. thoroughly revised. London: Baillière, Tindall and Cox, 1935. Pp. 455. Coloured plate. Figs. 67. Price 27*s.* 6*d.*

DR. RALPH PEMBERTON of Philadelphia has for many years taken a very active part in the investigation of chronic arthritis, and especially in the metabolic disturbances and the lowered sugar tolerance which, he finds, follows the incidence of focal infection and arthritis with remarkable parallelism. One of the diseases among the American forces during the war to which attention was specially directed was diabetes, but from intensive study of arthritis in the army the author found that its incidence was ten times that of diabetes, and his experience that arthritis seldom accurs in severe diabetes is confirmed by Joslin and F. M. Allen. The lowered sugar tolerance is regarded by the author as "mechanical" and due to constriction of the capillary bed, often caused by infection, and so to a diminished access of blood to the muscles. Evidence of capillary constriction in rheumatoid cases is brought forward, and it is significant that fevers, such as pneumonia and enteric, exercise, massage, heat and other methods of treatment, which also dilate the vessels, often relieve the arthritic symptoms, at least for a time. The question of diet is fully considered, and it is pointed out that the author's conclusions about lowered sugar tolerance and a low carbohydrate diet have sometimes been misunderstood; for, whereas many patients improve on a restricted diet, others improve on a high carbohydrate diet. The author's energy in connection with the problems of rheumatism, his wide view of the subject and the opinion of his colleagues are manifested by his chairmanship of the American Committee for the Control of Rheumatism which has been at work since 1928, and in 1933 originated the American Association for the Study and Control of Rheumatism.

Physical Signs in Clinical Surgery. By HAMILTON BAILEY, F.R.C.S. Fifth Edition. Bristol: John Wright & Sons, Ltd., 1935. Pp. 287. Illustrations 341, including some in colour. Price 21*s.*

IN eight years Mr. Bailey's book has gone through five editions and two additional reprintings. This speaks well for its popularity, and the new edition needs no introduction. It has been fully revised and enlarged, and as a clinical manual for the student it is one of the best guides available. The illustrations have been well chosen, and the publishers must also be congratulated on their share in the production of this valuable member of the every-day surgical library.

King's and some King's Men. By H. WILLOUGHBY LYLE, M.D., F.R.C.S. Oxford Medical Publications: Oxford University Press. London: Humphrey Milford, 1935. Pp. xi and 613. Plates 18. Price 25s.

THIS record of the Medical Department of King's College, London, from 1830 to 1909, and of King's College Hospital Medical School from 1909 to 1934, is a labour of love by the Dean Emeritus of the Medical School. It is a generous supplement to "The History of King's College and King's College Hospital" to the year 1880 by Professor John Curnow, who was physician to the Hospital, Dean of the Medical School, and Professor of Anatomy, a rather unusual combination. This is a veritable dictionary of biography of the numerous and distinguished medical and other men, living as well as dead, who were educated there and either became members of the teaching staff at King's College, its hospital, or elsewhere. Full of interesting information, it is well written and obviously the outcome of devoted industry for many years. King's College celebrated its centenary a few years ago, its medical faculty originated in 1831, and King's College Hospital first opened its doors in 1839, so this volume comes out appropriately in the middle of these celebrations

Great Doctors of the Nineteenth Century. By SIR WILLIAM HALE-WHITE, K.B.E., M.D., LL.D., F.R.C.P. London: Edward Arnold & Co. Pp. vii and 325. Price 15s.

THIS is an extremely interesting and pleasantly written account of British medical leaders in the last century. The table of contents gives the names of seventeen physicians, surgeons and gynæcologists, beginning with Edward Jenner and ending with Ronald Ross; the choice of these may possibly arouse the question whether other names, such as those of William Jenner, Broadbent, Ferrier, Allbutt, and Osler, might also seem worthy of inclusion. Such selection is always difficult, and this conceivable criticism has to some extent been met by references to contemporaries in the seventeen lives. Thus in the account of William Stokes, of Dublin, the life of his colleague and friend, R. J. Graves, is summarized. Five of the biographies are of past members of the Guy's Hospital staff—Astley Cooper, Bright, Addison, Gull, and Wilks—and contain thumbnail sketches of Hilton Fagge and Thomas Hodgkin. The author has previously written lives in the *Guy's Hospital Reports* of Bright and Addison, and here is at his best in his pictures of Gull, and especially of Wilks, which are based on close personal knowledge. The six surgeons—Astley Cooper, Charles Bell, James Paget, John Simon, William Bowman and Lister—show a great diversity of gifts and are admirably depicted. Neurology is further represented by Marshall Hall and Hughlings Jackson, tropical medicine by Manson and Ronald Ross, and obstetrics by James Simpson.

Inhalation Therapy Technique. By W. E. COLLISON. With Foreword by SIR BRUCE BRUCE-PORTER, K.B.E., C.M.G. London: Wm. Heinemann (Medical Books), 1935. Pp. 77. Figs. 9. Price 5*s*.

THIS well-produced book of 77 pages describes the treatment of disease by the inhalation of atomized liquids and oxygen, which has been popular in Germany for some years, and has made considerable progress in this country since the introduction of the improved Collison inhaler in 1932. Major Collison does not attempt in his book to teach medicine to the medical practitioner, but he does make clear the working of the apparatus and the physical problems involved in the method.

Incompatibility in Prescriptions. By THOMAS STEPHENSON, D.Sc., PH.C., F.R.S.E., F.C.S. Fourth Edition, revised and enlarged. Edinburgh: The Prescriber Office, 1935. Pp. viii and 62. Price 6*s*.

THIS new edition of a well-known favourite has been extensively revised in accordance with the British Pharmacopœia, 1932, and the British Pharmaceutical Codex, 1934 and, while nearly the same size as its predecessor of 1929, the present version contains references to all the newest remedies and bears evidence of copious rewriting of many sections. The alphabetical dictionary of incompatibilities remains as an almost unique list on this subject and as a modest reference work this little book should find a place on every practitioner's desk.

NOTES AND PREPARATIONS

NEW PREPARATIONS

Apondon.—This is a new preparation for fat-reduction in which the thyroid by-effects are avoided by the addition of ergocholin to the thyroid constituent. It is said to be well tolerated even by those who are susceptible to thyroid and can be administered for prolonged periods or given in relatively high doses. It is issued by Messrs. Coates and Cooper, Ltd., 94, Clerkenwell Road, London, E.C.1.

"Hypoloid" Histidine Hydrochloride.—This new product of Messrs. Burroughs, Wellcome & Co., Snow Hill Buildings, London, E.C.1, makes available a sterile 4 per cent. solution of histidine hydrochloride, for immediate use in cases of gastric and duodenal ulcer, recent investigation having shown the value of histidine in such cases. The preparation is administered daily intramuscularly or subcutaneously, for three weeks, with a minimum of dietary restrictions.

Normo-Gastrine.—This is the name given to a new preparation in tablet form of aluminium silicate. It is indicated in the treatment of hyperchlorhydria and digestive disorders arising therefrom, and is said to have certain advantages over bismuth, magnesium and sodium salts, as it is not alkaline and is not operative against as low a percentage of acidity as 0.15 per cent., the amount normally present in the stomach. The manufacturers are Messrs. Burgoyne, Burbridges & Co., Ltd., East Ham, London, E.6.

Par-isalon.—This new preparation, belonging to the adrenaline series, has been issued by Messrs. Coates and Cooper, Ltd., 94, Clerkenwell Road, London, E.C.1, and has apparently a maximum broncho-dilatory action, without causing any by-effects such as accelerated pulse or increased blood-pressure.

Phospho-Soda (Fleet).—This new preparation is manufactured in America and issued in England by the Anglo-French Drug Co., Ltd., 11–12, Guilford Street, London, W.C.1. It is a non-toxic, highly concentrated, aqueous solution of the primary sodium phosphate, or mono-sodium phosphate, differing from the ordinary sodium phosphate, and is free from syrup, glycerine or oil. It is indicated in the treatment of constipation, indigestion, disorders of the liver and gall-bladder, and other conditions resulting from these.

p^H VALUES

The British Drug Houses, Ltd. (Graham Street, City Road, London, N.1) have just issued a revised and enlarged edition of their booklet on "p^H values, what they are and how to determine them." There has been a persistent demand for this booklet by laboratory workers and students, and the publishers will send a copy to any reader of *The Practitioner* who applies for it.

COMBINED DEAF AID AND STETHOSCOPE

A combined deaf aid and stethoscope has been produced by the Multitone Electric Co., Ltd. (95-98, White Lion Street, Islington, London, N.1). Care has been taken to provide faithful reproduction of the very low notes of the heart sounds, and the instrument can be used by a deaf practitioner both for stethoscope purposes and as an ordinary deaf aid.

COW AND GATE PRODUCTS

Under the title " Suggested Standards for Milk Foods in Infant Feeding," Messrs. Cow & Gate, Ltd., have issued an attractive brochure. The claims made for the improved roller process method employed for this high standard British milk are substantiated by numerous experimental and laboratory facts and findings. The standards employed for cleanliness, fat content, vitamin content are high, and the results in infant feeding are known by practitioners to be very satisfactory. The large range of varieties of " Cow and Gate " available is a specially valuable feature of this firm's products: " lacidac," " hemolac," and " frailac " are the best known special forms of dried milk powder manufactured in addition to the main products—" Full Cream," " Half Cream," and " Separated " Cow and Gate.

THE CHOICE OF A HEARING AID

" The Choice of a Hearing Aid " is the title of a booklet of eight pages, issued by the National Institute for the Deaf, 105, Gower Street, London, W.C.1, at the price of three pence. The purpose of the booklet is to prevent deaf persons from being exploited by firms whose business methods in dealing with aids to hearing are grossly unfair. The National Institute for the Deaf maintains a list of approved dealers, which will be sent on request to any inquirer.

CADBURY'S CHOCOLATES

With the impending advent of Christmas, Messrs. Cadbury, of Bournville, have sent us their customary samples of chocolate in block form, Bourn-Vita, and assorted chocolates. Among the new series is a " Keepsake " casket at 7s. 6d., designed in Vienna for the manufacturers, the " Arlington " casket at 12s. 6d., containing two pounds of the favourite " Carnival " assortment, a new assortment called " Vogue," at 3s. for a pound box, and another " Continental " assortment, of rich quality, at 5s. for a pound. Messrs. Cadbury are said to take as much trouble in " balancing " a new assortment as a conductor does with an orchestra!

INDEX AND TITLE PAGE TO VOLUME CXXXV

Copies of the index and title page for Volume CXXXV of *The Practitioner* (July to December, 1935) are available post free on application. Cases for binding the Journal are supplied at 3*s*. each, post free to any part of the world.